On various equations regarding *Current Exchanges and Unconstrained Higher Spins,* accelerating cosmology and Supersymmetry Breaking: new possible mathematical connections with some parameters of Number Theory, PMS data and FS based on Phi. II

Michele Nardelli[1], **Antonio Nardelli**[2]

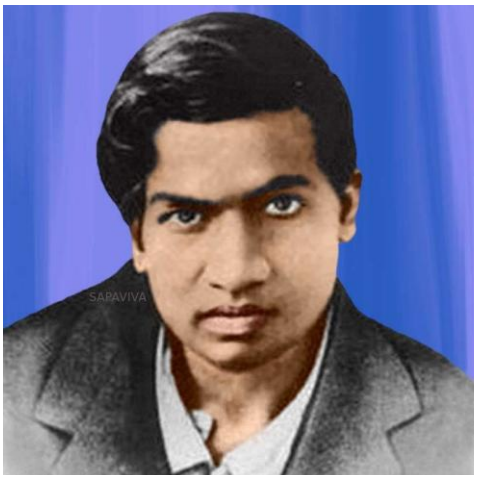
Abstract

In this research thesis (part II), we analyze various equations regarding ''Current Exchanges and Unconstrained Higher Spins'', accelerating cosmology and Supersymmetry Breaking. We describe new possible mathematical connections with some parameters of Number Theory, Planck multipole spectrum (PMS) data and Frequency System (FS) based on Phi

---

[1] M.Nardelli studied at Dipartimento di Scienze della Terra Università degli Studi di Napoli Federico II, Largo S. Marcellino, 10 - 80138 Napoli, Dipartimento di Matematica ed Applicazioni "R. Caccioppoli" - Università degli Studi di Napoli "Federico II" – Polo delle Scienze e delle Tecnologie Monte S. Angelo, Via Cintia (Fuorigrotta), 80126 Napoli, Italy

[2] A. Nardelli studies at the Università degli Studi di Napoli Federico II - Dipartimento di Studi Umanistici – **Sezione Filosofia - scholar of Theoretical Philosophy**



Srinivasa Ramanujan
(December 22, 1887 – April 26, 1920)

Joel Scherk
(1946-1980)

We want to highlight that the development of the various equations was carried out according an our possible logical and original interpretation

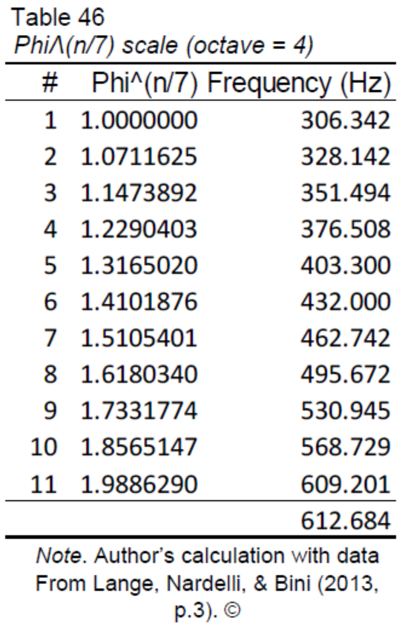


Table 46

Phi/\(n/7) scale (octave = 4)

#	Phi^(n/7)	Frequency (Hz)
1	1.0000000	306.342
2	1.0711625	328.142
3	1.1473892	351.494
4	1.2290403	376.508
5	1.3165020	403.300
6	1.4101876	432.000
7	1.5105401	462.742
8	1.6180340	495.672
9	1.7331774	530.945
10	1.8565147	568.729
11	1.9886290	609.201
		612.684

Note. Author's calculation with data From Lange, Nardelli, & Bini (2013, p.3). ©

Table of Frequency System based on Phi

Planck multipole spectrum data

103,1
103,98
124,55
127,88
162,27
179,33
191,16
208,67

213,07	
215,63	
218,14	
226,13	
232,56	150802.7363
239,6	
250,1	
278,34	
299,495	
319,73	
342,35	
365,19	
373,95	
374,45	
382,85	
387,21	
420,02	
477,66	
554,48	
581,438	
599,185	
620,243	
631,571	
639,652	
645,569	
645,593	
658,099	
658,83	
689,45	
691,994	
704,645	
722,68	
729,551	
732,75	
736,931	
743,136	
746,75	
749,62	
763,366	
768,34	
786,337	
793,96	
797,376	
806,23	

841,08
889,209
903,34
907,4
917,942
931,293
931,908
973,755
975,998
985,83
1003,34
1006,77
1017,97
1033,69
1034,38
1042,69
1042,9
1065,2
1076,17
1081,01
1113,53
1113,58
1118,05
1140,7
1162,04
1163,21
1170,97
1185,37
1204,04
1254,91
1283,88
1284,54
1298
1298,08
1354,41
1375,35
1402,5
1407,61
1425,6
1580,53
1619,33
1682,61
1691,91
1792,35

1819,88
1836,2
1863,84
1922,19
1927,53
1962,25
2016,71
2030,01
2124,69
2229,41
2237,31
2282,71
2341,59
2345,97
2396,51
2464,71
2484,24
2506,61
3027,82
3123,86
3893,83
4116,06
4867,41
4953,54
5524,53
5703,16

From:

Current Exchanges and Unconstrained Higher Spins - *D. Francia, J. Mourad and A. Sagnotti* - arXiv:hep-th/0701163v2 25 Mar 2007

$$\mathcal{F}_L \;=\; \mathcal{F} \;-\; \frac{1}{L^2}\left\{[(3-D-s)(2-s)-s]\;\varphi \;+\; 2\,g\,\varphi^{'}\right\}\,, \tag{2.23}$$

where D denotes the space-time dimension and

$$\mathcal{F} \;=\; \Box\,\varphi \,-\, \nabla\nabla\cdot\varphi \,+\, \nabla^{\,2}\varphi' \tag{2.24}$$

is the AdS-covariantized Fronsdal operator, that transforms according to

$$\delta\mathcal{F}_L \;=\; 3\,\nabla^{\,3}\Lambda' \,-\, \frac{4}{L^2}\,g\,\nabla\,\Lambda' \tag{2.25}$$

under the gauge transformation

$$\delta\varphi \;=\; \nabla\Lambda\ . \tag{2.26}$$

$L \to \infty$

s = 3, 4 or 5 0 ; D = 10

for s = 4 and $\mathcal{F}$ = 0.450052 , from

$$\mathcal{F}_L \;=\; \mathcal{F} \;-\; \frac{1}{L^2}\,\left\{[(3-D-s)(2-s)-s]\,\varphi \;+\; 2\,g\,\varphi^{'}\right\}\,,$$

We obtain:

0.450052 – 1/(8)^2 ((([(3-10-4)(2-4)-4]*0.911104684-2*0.9991104684)))

Input interpretation:

$$0.450052 - \frac{1}{8^2}\,(((3-10-4)\,(2-4)-4)\times 0.911104684 + 2\times(-0.9991104684))$$

Result:

0.2250260097625

0.2250260097625

(7+1/3)(((0.450052 – 1/(8)^2 ((([(3-10-4)(2-4)-4]*0.911104684-2*0.9991104684))))))

Input interpretation:

$$\left(7+\frac{1}{3}\right)\left(0.450052 - \frac{1}{8^2}\,(((3-10-4)\,(2-4)-4)\times 0.911104684 + 2\times(-0.9991104684))\right)$$

Result:

1.650190738258333333333333333333333333333333333333333333333333333333…

Repeating decimal:

$1.650190738258\overline{3}$ (period 1)

1.6501907382583 result very near to the 14th root of the following Ramanujan's class invariant $Q = \left(G_{505}/G_{101/5}\right)^3 = 1164.2696$ i.e. 1.65578...

From:

$$\mathcal{F} - \frac{1}{2}\,\eta\,\mathcal{F}\,' = J\,,$$

0.450052-1/2*0.450052

Input interpretation:

$0.450052 + \frac{1}{2} \times (-0.450052)$

Result:

0.225026

0.225026

$$\mathcal{F}^{(2)} - \frac{1}{4}\,\eta\,\mathcal{F}^{(2)\,\prime} = \mathcal{J}$$

0.450052-1/4*0.450052

Input interpretation:

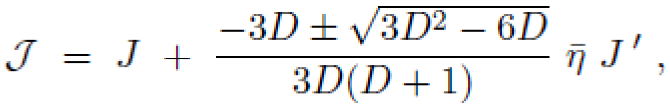
$0.450052 + \frac{1}{4} \times (-0.450052)$

Result:

0.337539

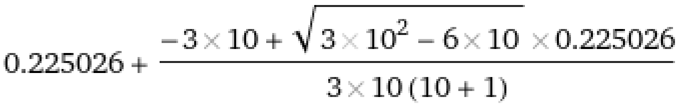
0.337539

From:


$$\mathcal{J} \;=\; J \;+\; \frac{-3D \pm \sqrt{3D^2 - 6D}}{3D(D+1)}\;\bar{\eta}\; J\,' \;,$$

0.225026+((-3*10+sqrt(3*10^2-6*10)*0.225026)) / (3*10(10+1))

Input interpretation:

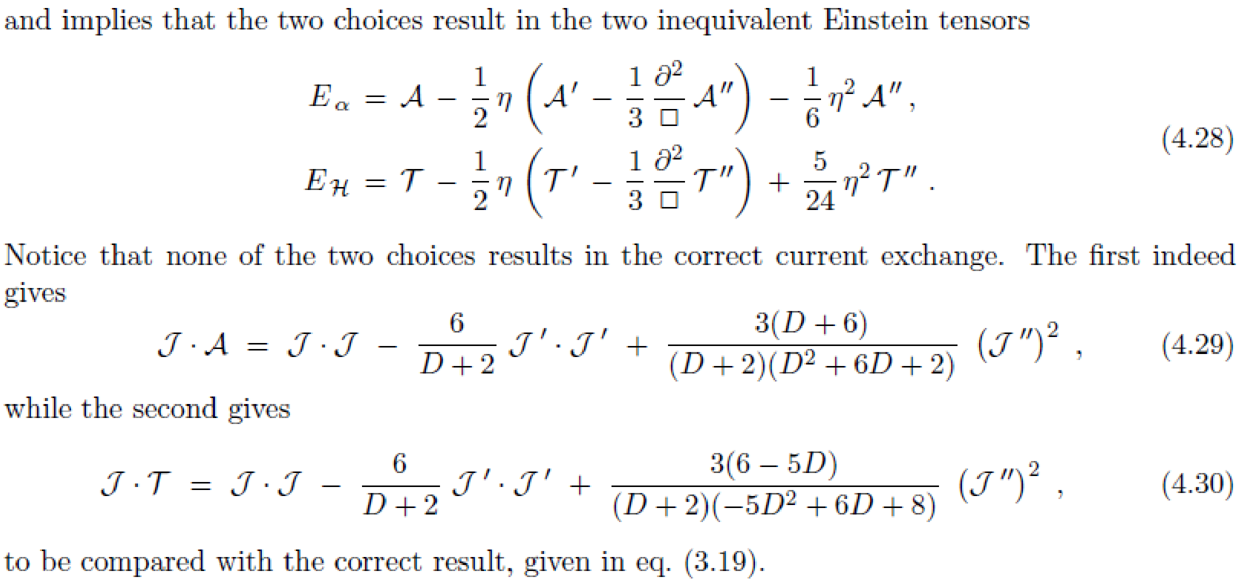

$$0.225026 + \frac{-3\times 10 + \sqrt{3\times 10^2 - 6\times 10}\times 0.225026}{3\times 10\,(10+1)}$$

Result:

0.144681…

0.144681…

From:


and implies that the two choices result in the two inequivalent Einstein tensors

$$\begin{aligned} E_\alpha &= \mathcal{A} - \frac{1}{2}\eta\left(\mathcal{A}' - \frac{1}{3}\frac{\partial^2}{\Box}\mathcal{A}''\right) - \frac{1}{6}\eta^2\mathcal{A}'' , \\ E_{\mathcal{H}} &= \mathcal{T} - \frac{1}{2}\eta\left(\mathcal{T}' - \frac{1}{3}\frac{\partial^2}{\Box}\mathcal{T}''\right) + \frac{5}{24}\eta^2\mathcal{T}'' . \end{aligned} \tag{4.28}$$

Notice that none of the two choices results in the correct current exchange. The first indeed gives

$$\mathcal{J}\cdot\mathcal{A} \;=\; \mathcal{J}\cdot\mathcal{J} \;-\; \frac{6}{D+2}\,\mathcal{J}\,'\cdot\mathcal{J}\,' \;+\; \frac{3(D+6)}{(D+2)(D^2+6D+2)}\;\left(\mathcal{J}\,''\right)^2 \;, \tag{4.29}$$

while the second gives

$$\mathcal{J}\cdot\mathcal{T} \;=\; \mathcal{J}\cdot\mathcal{J} \;-\; \frac{6}{D+2}\,\mathcal{J}\,'\cdot\mathcal{J}\,' \;+\; \frac{3(6-5D)}{(D+2)(-5D^2+6D+8)}\;\left(\mathcal{J}\,''\right)^2 \;, \tag{4.30}$$

to be compared with the correct result, given in eq. (3.19).

$$\mathcal{J} \cdot \mathcal{A} \;=\; \mathcal{J} \cdot \mathcal{J} \;-\; \frac{6}{D+2}\, \mathcal{J}\,' \cdot \mathcal{J}\,' \;+\; \frac{3(D+6)}{(D+2)(D^2+6D+2)}\; (\mathcal{J}\,'')^2 \;,$$

0.144681^2-(6/(10+2))*0.144681^2+ ((3(10+6)*0.144681^2)) / (((10+2)(10^2+6*10+2)))

Input interpretation:

$$0.144681^2 - \frac{6}{10+2} \times 0.144681^2 + \frac{3\,(10+6) \times 0.144681^2}{(10+2)\left(10^2+6\times 10+2\right)}$$

Result:

0.0109831499980555555555555555555555555555555555555555555555555555

…

Repeating decimal:

$0.0109831499980\overline{5}$ (period 1)

0.01098314999805

1/(((0.144681^2-(6/(10+2))*0.144681^2+ ((3(10+6)*0.144681^2)) / (((10+2)(10^2+6*10+2))))))

Input interpretation:

$$\frac{1}{0.144681^2 - \frac{6}{10+2} \times 0.144681^2 + \frac{3\,(10+6) \times 0.144681^2}{(10+2)\left(10^2+6\times 10+2\right)}}$$

Result:

91.048560765995080478378383740058602044961049281923455094937451805

…

91.048560765995…

$$\mathcal{J} \cdot \mathcal{T} \;=\; \mathcal{J} \cdot \mathcal{J} \;-\; \frac{6}{D+2}\, \mathcal{J}\,' \cdot \mathcal{J}\,' \;+\; \frac{3(6-5D)}{(D+2)(-5D^2+6D+8)}\; (\mathcal{J}\,'')^2 \;,$$

0.144681^2-(6/(10+2))*0.144681^2+ ((3(6-5*10)*0.144681^2)) / (((10+2)(-5*10^2+6*10+8)))

Input interpretation:

$$0.144681^2-\frac{6}{10+2}\times 0.144681^2+\frac{3\,(6-5\times 10)\times 0.144681^2}{(10+2)\left(-5\times 10^2+6\times 10+8\right)}$$

Result:

0.010999301689229166666666666666666666666666666666666666666666666666

…

Repeating decimal:

$0.0109993016892291\overline{6}$ (period 1)

0.01099930168922916

1/(((0.144681^2-(6/(10+2))*0.144681^2+ ((3(6-5*10)*0.144681^2)) / (((10+2)(-5*10^2+6*10+8))))))

Input interpretation:

$$\frac{1}{0.144681^2-\frac{6}{10+2}\times 0.144681^2+\frac{3\,(6-5\times 10)\times 0.144681^2}{(10+2)\left(-5\times 10^2+6\times 10+8\right)}}$$

Result:

90.914862438879081828630397860851467533881811324093905234298777133

…

90.914862438879…

Performing the difference between the two expressions and after some calculations, we obtain:

1/(((1/(((0.144681^2-(6/(10+2))*0.144681^2+ ((3(10+6)*0.144681^2)) / (((10+2)(10^2+6*10+2))))))-90.914862438879081828 63)))^1/4

Input interpretation:

$$\frac{1}{\sqrt[4]{\frac{1}{0.144681^2-\frac{6}{10+2}\times 0.144681^2+\frac{3\,(10+6)\times 0.144681^2}{(10+2)\left(10^2+6\times 10+2\right)}}-90.91486243887908182863}}$$

Result:

1.653744857418439902423086759805025668393842235172480153200745 1418
…

1.653744857418…. result very near to the 14th root of the following Ramanujan's class invariant $Q = \left(G_{505}/G_{101/5}\right)^3 = 1164.2696$ i.e. 1.65578...

And from the sum:

609.201/((2(((1/(((0.144681^2-(6/(10+2))*0.144681^2+ ((3(10+6)*0.144681^2)) / (((10+2)(10^2+6*10+2))))))+90.91486243887908182863)))+13))

Where 609.201 is a value of the Frequency system based on Phi

Input interpretation:

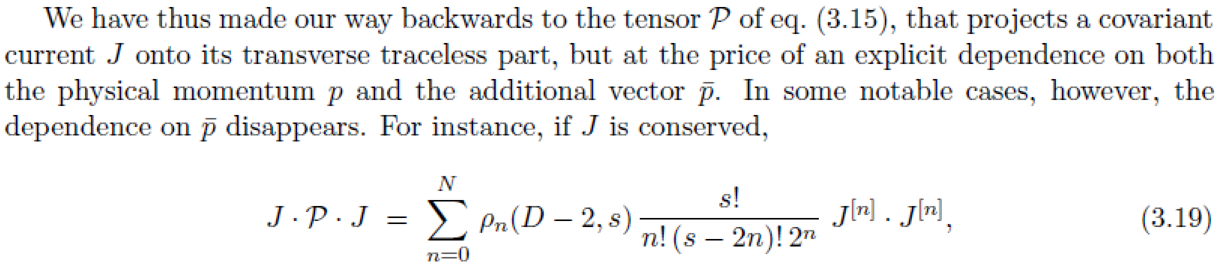
$$\frac{609.201}{2\left(\frac{1}{0.144681^2-\frac{6}{10+2}\times 0.144681^2+\frac{3(10+6)\times 0.144681^2}{(10+2)(10^2+6\times 10+2)}}+90.91486243887908182863\right)+13}$$

Result:

1.6162313876092335878313347793271212567291508387341289352681724797
…

1.6162313876…. result that is a very good approximation to the value of the golden ratio 1.618033988749...

Now we have that:



We have thus made our way backwards to the tensor $\mathcal{P}$ of eq. (3.15), that projects a covariant current J onto its transverse traceless part, but at the price of an explicit dependence on both the physical momentum p and the additional vector $\bar{p}$. In some notable cases, however, the dependence on $\bar{p}$ disappears. For instance, if J is conserved,

$$J \cdot \mathcal{P} \cdot J \; = \; \sum_{n=0}^{N} \rho_n(D-2,s) \, \frac{s!}{n!\,(s-2n)!\,2^n} \; J^{[n]} \cdot J^{[n]} , \tag{3.19}$$

For:

J = 0.225026; ; D = 10; s = 4

From:

$$P(D,s) = \frac{(D+s-1)!}{(D-1)!\,s!} \; , \tag{3.13}$$

((8+4-1))! / (((8-1)! 4!))

Input:

$$\frac{(8+4-1)!}{(8-1)! \times 4!}$$

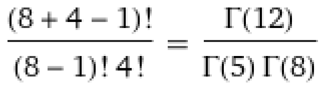
$n!$ is the factorial function

Result:

330

330

Alternative representations:



$$\frac{(8+4-1)!}{(8-1)!\,4!} = \frac{\Gamma(12)}{\Gamma(5)\,\Gamma(8)}$$

$$\frac{(8+4-1)!}{(8-1)!\,4!} = \frac{\Gamma(12,0)}{\Gamma(5,0)\,\Gamma(8,0)}$$

$$\frac{(8+4-1)!}{(8-1)!\,4!} = \frac{(1)_{11}}{(1)_4\,(1)_7}$$

Series representation:

$$\frac{(8+4-1)!}{(8-1)!\,4!} = \frac{\sum_{k=0}^{\infty} \frac{(11-n_0)^k\,\Gamma^{(k)}(1+n_0)}{k!}}{\left(\sum_{k=0}^{\infty} \frac{(4-n_0)^k\,\Gamma^{(k)}(1+n_0)}{k!}\right)\sum_{k=0}^{\infty} \frac{(7-n_0)^k\,\Gamma^{(k)}(1+n_0)}{k!}}$$

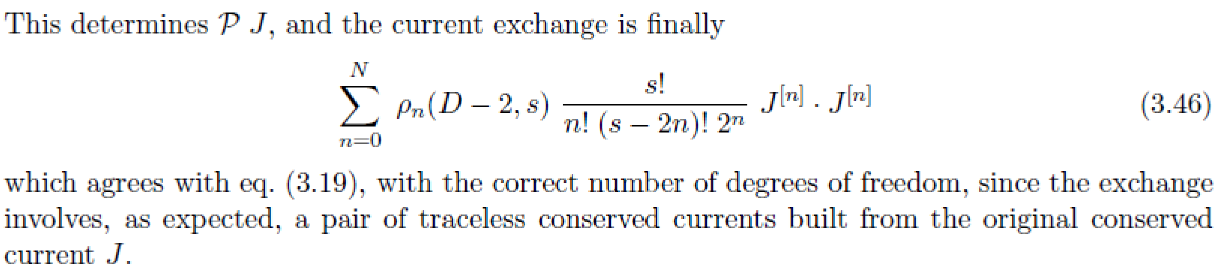
for $((n_0 \geq 0 \text{ or } n_0 \notin \mathbb{Z}) \text{ and } n_0 \to 4 \text{ and } n_0 \to 7 \text{ and } n_0 \to 11)$

Integral representations:

$$\frac{(8+4-1)!}{(8-1)!\,4!} = \frac{\int_0^1 \log^{11}\left(\frac{1}{t}\right) dt}{\left(\int_0^1 \log^4\left(\frac{1}{t}\right) dt\right) \int_0^1 \log^7\left(\frac{1}{t}\right) dt}$$

$$\frac{(8+4-1)!}{(8-1)!\,4!} = \frac{\int_0^\infty e^{-t}\,t^{11}\,dt}{\left(\int_0^\infty e^{-t}\,t^4\,dt\right) \int_0^\infty e^{-t}\,t^7\,dt}$$

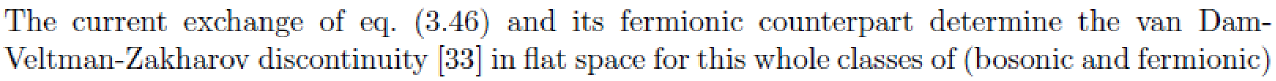
$$\frac{(8+4-1)!}{(8-1)!\,4!} = \frac{\int_1^\infty e^{-t}\,t^{11}\,dt + \sum_{k=0}^{\infty} \frac{(-1)^k}{(12+k)\,k!}}{\left(\int_1^\infty e^{-t}\,t^4\,dt + \sum_{k=0}^{\infty} \frac{(-1)^k}{(5+k)\,k!}\right)\left(\int_1^\infty e^{-t}\,t^7\,dt + \sum_{k=0}^{\infty} \frac{(-1)^k}{(8+k)\,k!}\right)}$$



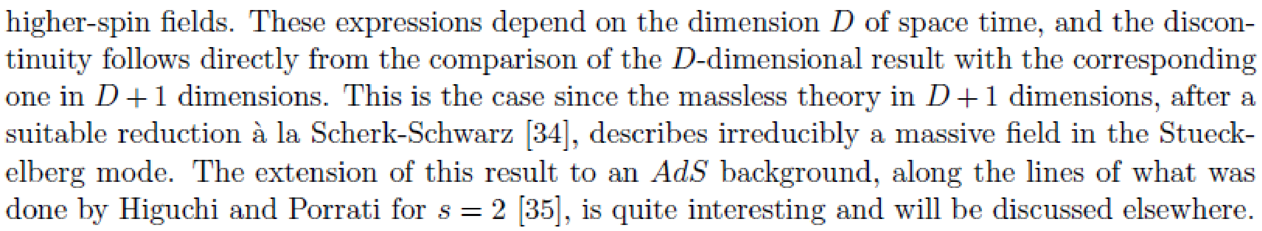
This determines $\mathcal{P}\,J$, and the current exchange is finally

$$\sum_{n=0}^{N} \rho_n(D-2,s)\,\frac{s!}{n!\,(s-2n)!\,2^n}\; J^{[n]}\cdot J^{[n]} \tag{3.46}$$

which agrees with eq. (3.19), with the correct number of degrees of freedom, since the exchange involves, as expected, a pair of traceless conserved currents built from the original conserved current J.

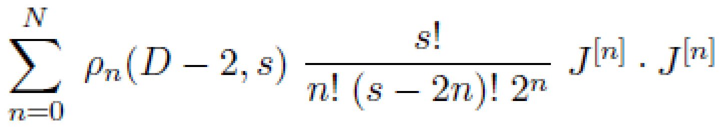


The current exchange of eq. (3.46) and its fermionic counterpart determine the van Dam-Veltman-Zakharov discontinuity [33] in flat space for this whole classes of (bosonic and fermionic)



higher-spin fields. These expressions depend on the dimension D of space time, and the discontinuity follows directly from the comparison of the D-dimensional result with the corresponding one in $D+1$ dimensions. This is the case since the massless theory in $D+1$ dimensions, after a suitable reduction à la Scherk-Schwarz [34], describes irreducibly a massive field in the Stueckelberg mode. The extension of this result to an AdS background, along the lines of what was done by Higuchi and Porrati for $s=2$ [35], is quite interesting and will be discussed elsewhere.

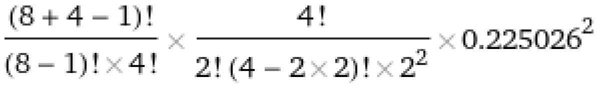
For n = 2 , s = 4, J = 0.225026 , we obtain:



$$\sum_{n=0}^{N} \rho_n(D-2,s)\,\frac{s!}{n!\,(s-2n)!\,2^n}\; J^{[n]}\cdot J^{[n]}$$

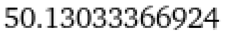
((8+4-1))! / (((8-1)! 4!)) * (4!) / ((2!(4-2*2)! 2^2)) * 0.225026^2

Input interpretation:



$$\frac{(8+4-1)!}{(8-1)!\times 4!}\times\frac{4!}{2!\,(4-2\times 2)!\times 2^2}\times 0.225026^2$$

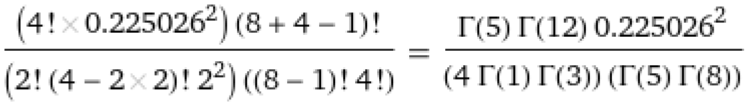
Result:



50.13033366924

50.13033366924

Alternative representations:



$$\frac{(4!\times 0.225026^2)\,(8+4-1)!}{(2!\,(4-2\times 2)!\,2^2)\,((8-1)!\,4!)} = \frac{\Gamma(5)\,\Gamma(12)\,0.225026^2}{(4\,\Gamma(1)\,\Gamma(3))\,(\Gamma(5)\,\Gamma(8))}$$

$$\frac{\left(4!\times 0.225026^2\right)(8+4-1)!}{\left(2!\,(4-2\times 2)!\,2^2\right)((8-1)!\,4!)}=\frac{\Gamma(5,0)\,\Gamma(12,0)\,0.225026^2}{(4\,\Gamma(1,0)\,\Gamma(3,0))\,(\Gamma(5,0)\,\Gamma(8,0))}$$

$$\frac{\left(4!\times 0.225026^2\right)(8+4-1)!}{\left(2!\,(4-2\times 2)!\,2^2\right)((8-1)!\,4!)}=\frac{(1)_4\,(1)_{11}\,0.225026^2}{(4\,(1)_0\,(1)_2)\,((1)_4\,(1)_7)}$$

Series representation:

$$\frac{\left(4!\times 0.225026^2\right)(8+4-1)!}{\left(2!\,(4-2\times 2)!\,2^2\right)((8-1)!\,4!)}=$$
$$\frac{0.0126592\sum_{k=0}^{\infty}\frac{(11-n_0)^k\,\Gamma^{(k)}(1+n_0)}{k!}}{\left(\sum_{k=0}^{\infty}\frac{(2-n_0)^k\,\Gamma^{(k)}(1+n_0)}{k!}\right)\left(\sum_{k=0}^{\infty}\frac{(7-n_0)^k\,\Gamma^{(k)}(1+n_0)}{k!}\right)\sum_{k=0}^{\infty}\frac{(-n_0)^k\,\Gamma^{(k)}(1+n_0)}{k!}}$$

for $((n_0 \geq 0 \text{ or } n_0 \notin \mathbb{Z}) \text{ and } n_0 \to 0 \text{ and } n_0 \to 2 \text{ and } n_0 \to 7 \text{ and } n_0 \to 11)$

Integral representations:

$$\frac{\left(4!\times 0.225026^2\right)(8+4-1)!}{\left(2!\,(4-2\times 2)!\,2^2\right)((8-1)!\,4!)}=\frac{0.0126592\int_0^1\log^{11}\left(\frac{1}{t}\right)dt}{\left(\int_0^1 1\,dt\right)\left(\int_0^1\log^2\left(\frac{1}{t}\right)dt\right)\int_0^1\log^7\left(\frac{1}{t}\right)dt}$$

$$\frac{\left(4!\times 0.225026^2\right)(8+4-1)!}{\left(2!\,(4-2\times 2)!\,2^2\right)((8-1)!\,4!)}=\frac{0.0126592\int_0^{\infty}e^{-t}\,t^{11}\,dt}{\left(\int_0^{\infty}e^{-t}\,dt\right)\left(\int_0^{\infty}e^{-t}\,t^2\,dt\right)\int_0^{\infty}e^{-t}\,t^7\,dt}$$

For n = 1/12 , s = 4, J = 0.225026 , we obtain:

((8+4-1))! / (((8-1)! 4!)) * (4!) / ((((1/12)!(4-2*(1/12))! 2^(1/12))) * 0.225026^2

Input interpretation:

$$\frac{(8+4-1)!}{(8-1)!\times 4!}\times\frac{4!}{\frac{1}{12}!\left(4-2\times\frac{1}{12}\right)!\sqrt[12]{2}}\times 0.225026^{2}$$

$n!$ is the factorial function

Result:

21.0894…

21.0894….

Alternative representations:

$$\frac{\left(4!\times 0.225026^{2}\right)(8+4-1)!}{\left(\frac{1}{12}!\left(4-\frac{2}{12}\right)!\sqrt[12]{2}\right)((8-1)!\,4!)}=\frac{\Gamma(5)\,\Gamma(12)\,0.225026^{2}}{(\Gamma(5)\,\Gamma(8))\left(\Gamma\left(5-\frac{2}{12}\right)\Gamma\left(1+\frac{1}{12}\right)\sqrt[12]{2}\right)}$$

$$\frac{\left(4!\times 0.225026^{2}\right)(8+4-1)!}{\left(\frac{1}{12}!\left(4-\frac{2}{12}\right)!\sqrt[12]{2}\right)((8-1)!\,4!)}=\frac{(1)_4\,(1)_{11}\,0.225026^{2}}{((1)_4\,(1)_7)\left((1)_{4-\frac{2}{12}}\,(1)_{\frac{1}{12}}\sqrt[12]{2}\right)}$$

$$\frac{\left(4!\times 0.225026^{2}\right)(8+4-1)!}{\left(\frac{1}{12}!\left(4-\frac{2}{12}\right)!\sqrt[12]{2}\right)((8-1)!\,4!)}=\frac{\Gamma(5,0)\,\Gamma(12,0)\,0.225026^{2}}{(\Gamma(5,0)\,\Gamma(8,0))\left(\Gamma\left(5-\frac{2}{12},0\right)\Gamma\left(1+\frac{1}{12},0\right)\sqrt[12]{2}\right)}$$

Series representation:

$$\frac{\left(4!\times 0.225026^2\right)(8+4-1)!}{\left(\frac{1}{12}!\left(4-\frac{2}{12}\right)!\sqrt[12]{2}\right)((8-1)!\,4!)} = \frac{0.0477947\sum_{k=0}^{\infty}\frac{(11-n_0)^k\,\Gamma^{(k)}(1+n_0)}{k!}}{\left(\sum_{k=0}^{\infty}\frac{\left(\frac{1}{12}-n_0\right)^k\Gamma^{(k)}(1+n_0)}{k!}\right)\left(\sum_{k=0}^{\infty}\frac{\left(\frac{23}{6}-n_0\right)^k\Gamma^{(k)}(1+n_0)}{k!}\right)\sum_{k=0}^{\infty}\frac{(7-n_0)^k\,\Gamma^{(k)}(1+n_0)}{k!}}$$

$$\text{for }\left((n_0\geq 0\text{ or }n_0\notin\mathbb{Z})\text{ and }n_0\to\frac{1}{12}\text{ and }n_0\to\frac{23}{6}\text{ and }n_0\to 7\text{ and }n_0\to 11\right)$$

Integral representation:

$$\frac{\left(4!\times 0.225026^2\right)(8+4-1)!}{\left(\frac{1}{12}!\left(4-\frac{2}{12}\right)!\sqrt[12]{2}\right)((8-1)!\,4!)} = \frac{0.0477947\int_0^1\log^{11}\left(\frac{1}{t}\right)dt}{\left(\int_0^1\sqrt[12]{\log\left(\frac{1}{t}\right)}\,dt\right)\left(\int_0^1\log^{23/6}\left(\frac{1}{t}\right)dt\right)\int_0^1\log^7\left(\frac{1}{t}\right)dt}$$

34*1/[((8+4-1))! / (((8-1)! 4!)) * (4!) / (((1/12)!(4-2*(1/12))! 2^(1/12))) * 0.225026^2]

Input interpretation:

$$34\times\frac{1}{\frac{(8+4-1)!}{(8-1)!\times 4!}\times\frac{4!}{\frac{1}{12}!\left(4-2\times\frac{1}{12}\right)!\sqrt[12]{2}}\times 0.225026^2}$$

$n!$ is the factorial function

Result:

1.612187772823277682760870518610376205508611913765465089949052484 8...

1.612187772823….. result that is a very good approximation to the value of the golden ratio 1.618033988749...

Alternative representations:

$$\frac{34}{\frac{(8+4-1)!\,4!\times 0.225026^2}{((8-1)!\,4!)\left(\frac{1}{12}!\left(4-\frac{2}{12}\right)!\,\sqrt[12]{2}\right)}} = \frac{34}{\frac{\Gamma(5)\,\Gamma(12)\,0.225026^2}{(\Gamma(5)\,\Gamma(8))\left(\Gamma\left(5-\frac{2}{12}\right)\Gamma\left(1+\frac{1}{12}\right)\sqrt[12]{2}\right)}}$$

$$\frac{34}{\frac{(8+4-1)!\,4!\times 0.225026^2}{((8-1)!\,4!)\left(\frac{1}{12}!\left(4-\frac{2}{12}\right)!\,\sqrt[12]{2}\right)}} = \frac{34}{\frac{(1)_4\,(1)_{11}\,0.225026^2}{((1)_4\,(1)_7)\left((1)_{4-\frac{2}{12}}\,(1)_{\frac{1}{12}}\,\sqrt[12]{2}\right)}}$$

$$\frac{34}{\frac{(8+4-1)!\,4!\times 0.225026^2}{((8-1)!\,4!)\left(\frac{1}{12}!\left(4-\frac{2}{12}\right)!\,\sqrt[12]{2}\right)}} = \frac{34}{\frac{\Gamma(5,0)\,\Gamma(12,0)\,0.225026^2}{(\Gamma(5,0)\,\Gamma(8,0))\left(\Gamma\left(5-\frac{2}{12},0\right)\Gamma\left(1+\frac{1}{12},0\right)\sqrt[12]{2}\right)}}$$

Series representation:

$$\frac{34}{\frac{(8+4-1)!\,4!\times 0.225026^2}{((8-1)!\,4!)\left(\frac{1}{12}!\left(4-\frac{2}{12}\right)!\,\sqrt[12]{2}\right)}} = \left(711.376\sum_{k_1=0}^{\infty}\sum_{k_2=0}^{\infty}\sum_{k_3=0}^{\infty}\frac{1}{k_1!\,k_2!\,k_3!}\left(\frac{1}{12}-n_0\right)^{k_1}\left(\frac{23}{6}-n_0\right)^{k_2}(7-n_0)^{k_3}\,\Gamma^{(k_1)}(1+n_0)\,\Gamma^{(k_2)}(1+n_0)\,\Gamma^{(k_3)}(1+n_0)\right)\Big/\left(\sum_{k=0}^{\infty}\frac{(11-n_0)^k\,\Gamma^{(k)}(1+n_0)}{k!}\right)$$

$$\text{for } \left((n_0\geq 0 \text{ or } n_0\notin\mathbb{Z}) \text{ and } n_0\to\frac{1}{12} \text{ and } n_0\to\frac{23}{6} \text{ and } n_0\to 7 \text{ and } n_0\to 11\right)$$

Integral representations:

$$\frac{34}{\frac{(8+4-1)!\,4!\times 0.225026^2}{((8-1)!\,4!)\left(\frac{1}{12}!\left(4-\frac{2}{12}\right)!\,\sqrt[12]{2}\right)}} = \int_0^1\int_0^1\int_0^1 \sqrt[12]{\log\left(\frac{1}{t_1}\right)}\,\log^{23/6}\left(\frac{1}{t_2}\right)\log^7\left(\frac{1}{t_3}\right)dt_3\,dt_2\,dt_1$$

$$\frac{34}{\frac{(8+4-1)!\,4!\times 0.225026^2}{((8-1)!\,4!)\left(\frac{1}{12}!\left(4-\frac{2}{12}\right)!\,\sqrt[12]{2}\right)}} =$$

$$\left(711.376\left(\int_1^\infty e^{-t}\sqrt[12]{t}\,dt+\sum_{k=0}^\infty\frac{(-1)^k}{\left(\frac{13}{12}+k\right)k!}\right)\left(\int_1^\infty e^{-t}\,t^{23/6}\,dt+\sum_{k=0}^\infty\frac{(-1)^k}{\left(\frac{29}{6}+k\right)k!}\right)\right.$$
$$\left.\left(\int_1^\infty e^{-t}\,t^7\,dt+\sum_{k=0}^\infty\frac{(-1)^k}{(8+k)\,k!}\right)\right)\Big/\left(\int_1^\infty e^{-t}\,t^{11}\,dt+\sum_{k=0}^\infty\frac{(-1)^k}{(12+k)\,k!}\right)$$

Now, we have that:

$$\mathcal{D}_{nl} = \frac{1}{2}\sum_{k=2}^{n+1} a_k \left\{\frac{1}{2k-3}\,\frac{\partial^{2(k-2)}}{\Box^{k-2}}\,\mathcal{F}^{(n+1)\,[k]} + \frac{2n+4k+1}{2(2k-1)(n-k+1)}\,\frac{\partial^{2(k-1)}}{\Box^{k-1}}\,\mathcal{F}^{(n+1)\,[k+1]}\right.$$
$$\left. + \frac{n+k+1}{2(n-k)(n-k+1)}\,\frac{\partial^{2k}}{\Box^{k}}\,\mathcal{F}^{(n+1)\,[k+2]}\right\} \qquad (4.69)$$

We know that:

n = 2 ;   k = 2.5

$$\Box = \partial^\mu\partial_\mu = g^{\mu\nu}\partial_\nu\partial_\mu = \frac{1}{c^2}\frac{\partial^2}{\partial t^2} - \frac{\partial^2}{\partial x^2} - \frac{\partial^2}{\partial y^2} - \frac{\partial^2}{\partial z^2}$$
$$= \frac{1}{c^2}\frac{\partial^2}{\partial t^2} - \nabla^2 = \frac{1}{c^2}\frac{\partial^2}{\partial t^2} - \Delta\ .$$

Or

$$\Box = \frac{1}{c^2}\frac{\partial^2}{\partial t^2} - \frac{\partial^2}{\partial x^2} - \frac{\partial^2}{\partial y^2} - \frac{\partial^2}{\partial z^2}.$$

= 7.42794088341672 × 10^-34

$$a_k = (-1)^{k+1}(2k-1)\frac{n+2}{n-1}\prod_{j=-1}^{k-1}\frac{n+j}{n-j+1}, \qquad (4.66)$$

(-1)^3.5 (2*2.5-1)*4*(2+1)/(2-1+1)

Input:

$$(-1)^{3.5}(2\times 2.5-1)\times 4\times\frac{2+1}{2-1+1}$$

Result:

$-24.\,i$

Polar coordinates:

$r = 24$ (radius), $\theta = -90.°$ (angle)

24 value that is linked to the "Ramanujan function" (an elliptic modular function that satisfies the need for "conformal symmetry") that has 24 "modes" corresponding to the physical vibrations of a bosonic string.

For n = 2 ; k = 2.5

$$\mathcal{D}_{nl} = \frac{1}{2}\sum_{k=2}^{n+1} a_k \left\{ \frac{1}{2k-3}\frac{\partial^{2(k-2)}}{\Box^{k-2}}\mathcal{F}^{(n+1)}[k] + \frac{2n+4k+1}{2(2k-1)(n-k+1)}\frac{\partial^{2(k-1)}}{\Box^{k-1}}\mathcal{F}^{(n+1)}[k+1] + \frac{n+k+1}{2(n-k)(n-k+1)}\frac{\partial^{2k}}{\Box^{k}}\mathcal{F}^{(n+1)}[k+2] \right\}$$

1/2* 24 [1/2* derivative x^7.5 * 1/sqrt(7.42794088341672 × 10^-34) + 15/4 * third derivative x^10.5 * 1/(7.42794088341672 × 10^-34)^1.5 + 5.5/(-0.5) * fifth derivative x^13.5 * 1/(7.42794088341672 × 10^-34)^2.5]

1/2* 24 [1/2* (7.5 x^6.5) * 1/sqrt(7.42794088341672 × 10^-34) + 15/4 * (847.875 x^7.5) * 1/(7.42794088341672 × 10^-34)^1.5 + 5.5/(-0.5) * (193577 x^8.5) * 1/(7.42794088341672 × 10^-34)^2.5]

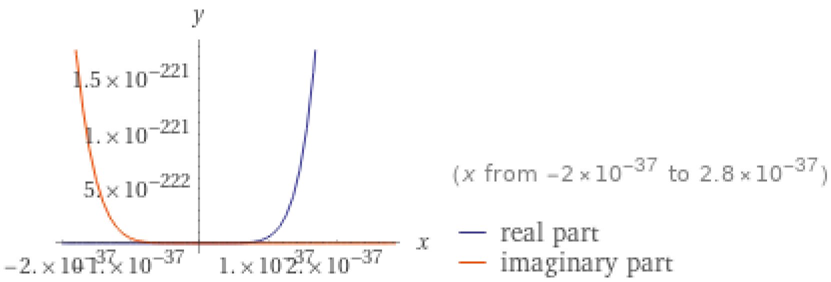
Input interpretation:

$$\frac{1}{2}\times 24\left(\frac{1}{2}\left(7.5\,x^{6.5}\right)\times\frac{1}{\sqrt{7.42794088341672\times 10^{-34}}}+\frac{15}{4}\left(847.875\,x^{7.5}\right)\times\frac{1}{\left(7.42794088341672\times 10^{-34}\right)^{1.5}}+-\frac{5.5}{0.5}\left(193\,577\,x^{8.5}\right)\times\frac{1}{\left(7.42794088341672\times 10^{-34}\right)^{2.5}}\right)$$

Result:

$$12\left(-1.41604\times 10^{89}\,x^{8.5}+1.57058\times 10^{53}\,x^{7.5}+1.37593\times 10^{17}\,x^{6.5}\right)$$

Plot:



Alternate forms:

$$x^{13/2}\left(-1.69925\times 10^{90}\,x^{2}+1.8847\times 10^{54}\,x+1.65112\times 10^{18}\right)$$

$$-1.69925\times 10^{90}\,x^{17/2}+1.8847\times 10^{54}\,x^{15/2}+1.65112\times 10^{18}\,x^{13/2}$$

Expanded form:

$$-1\,699\,247\,303\,926\,710\,850\,517\,538\,724\,093\,232\,862\,725\,665\,284\,425\,834\,496\,492\,802\,427\,591\,844\,417\,559\,061\,806\,360\,559\,616\,x^{8.5} + 1\,884\,697\,636\,109\,895\,277\,275\,152\,851\,821\,268\,900\,587\,469\,139\,626\,426\,368\,x^{7.5} + 1\,651\,118\,693\,691\,822\,848\,x^{6.5}$$

Roots:

$x \approx -5.76459 \times 10^{-37}$

$x = 0$

$x \approx 1.6856 \times 10^{-36}$

Properties as a real function:

Domain

$\{x \in \mathbb{R} : x \geq 0\}$ (all non-negative real numbers)

Range

$$
\begin{aligned}
\{y \in \mathbb{R} : y \le \Big(3\, & \big(802\,041\,878\,744\,836\,946\,670\,591\,099\,425\,150\,387\,044\,756\,298\,951\,316\,374\,340\,587\,643\,238\,367\,996\,645\,789\,312\,180\,903\,799\,835\,467\,455\,417\,329\,864\,618\,320\,367\,448\,655\,833 \\
& \sqrt{\left(4\,814\,534\,027\,792\,345\left(2\,355\,872\,045\,137\,368 + 121\sqrt{1\,555\,478\,579\,667\,845\,401\,939\,640\,609}\right)\right)} + \\
& 20\,312\,121\,831\,212\,477\,752\,368\,988\,479\,830\,300\,595\,350\,843\,418\,522\,963\,223\,313\,725\,103\,336\,067\,899\,761\,109\,337\,752\,209\,055\,202\,444\,365\,048\,400\,560\,536 \\
& \sqrt{\left(7\,488\,904\,551\,312\,947\,720\,620\,810\,477\,181\,366\,981\,338\,105\left(2\,355\,872\,045\,137\,368 + 121\sqrt{1\,555\,478\,579\,667\,845\,401\,939\,640\,609}\right)\right)}\big)\Big) \Big/ \\
& 3\,067\,347\,803\,051\,045\,438\,340\,090\,643\,259\,713\,372\,478\,148\,196\,841\,381\,084\,338\,183\,207\,079\,657\,302\,829\,833\,895\,838\,821\,672\,348\,229\,228\,856\,999\,255\,056\,963\,750\,121\,337\,890\,625\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000 \\
& 000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000 \\
& 000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,000\}
\end{aligned}
$$

$\mathbb{R}$ is the set of real numbers

Derivative:

$$
\begin{aligned}
\frac{d}{dx}\Big(12\, & \big(-141\,603\,941\,993\,892\,570\,876\,461\,560\,341\,102\,738\,560\,472\,107\,035\,486\,208\,041\,066\,868\,965\,987\,034\,796\,588\,483\,863\,379\,968\, x^{8.5} + \\
& 157\,058\,136\,342\,491\,273\,106\,262\,737\,651\,772\,408\,382\,289\,094\,968\,868\,864\, x^{7.5} + 137\,593\,224\,474\,318\,576\, x^{6.5}\big)\Big) = \\
& -14\,443\,602\,083\,377\,044\,151\,728\,685\,633\,674\,629\,919\,795\,835\,725\,914\,938\,440\,491\,300\,435\,204\,103\,985\,559\,572\,360\,435\,073\,024\, x^{7.5} + \\
& 14\,135\,232\,270\,824\,214\,069\,140\,096\,007\,251\,821\,559\,344\,107\,399\,545\,880\,576\, x^{6.5} + 10\,732\,271\,508\,996\,849\,664\, x^{5.5}
\end{aligned}
$$

Indefinite integral:

$$\int \frac{24}{2}\left(\frac{7.5\,x^{6.5}}{2\sqrt{7.42794088341672\times 10^{-34}}}+\frac{15\,(847.875\,x^{7.5})}{4\,(7.42794088341672\times 10^{-34})^{1.5}}+\right.$$
$$\left.-\frac{5.5\,(193\,577\,x^{8.5})}{0.5\,(7.42794088341672\times 10^{-34})^{2.5}}\right)dx =$$
$$x^{15/2}\left(-1.78868\times 10^{89}\,x^{2}+2.21729\times 10^{53}\,x+2.20149\times 10^{17}\right)+\text{constant}$$

For $x = 1.6856 * 10^{-36}$:

12 (-1.41604×10^89 (1.6856e-36)^8.5 + 1.57058×10^53 (1.6856e-36)^7.5 + 1.37593×10^17 (1.6856e-36)^6.5)

Input interpretation:

$$12\left(-1.41604\times 10^{89}\,(1.6856\times 10^{-36})^{8.5}+1.57058\times 10^{53}\,(1.6856\times 10^{-36})^{7.5}+1.37593\times 10^{17}\,(1.6856\times 10^{-36})^{6.5}\right)$$

Result:

$$-7.24108\ldots\times 10^{-220}$$

$-7.24108\ldots*10^{-220}$

1+((((12 (-1.41604×10^89 (1.6856e-36)^8.5 + 1.57058×10^53 (1.6856e-36)^7.5 + 1.37593×10^17 (1.6856e-36)^6.5)))))^1/1152

Where 1152 = 1024+128 = 64*16 + 64*2

Input interpretation:

$$1+\left(12\left(-1.41604\times 10^{89}\,(1.6856\times 10^{-36})^{8.5}+1.57058\times 10^{53}\,(1.6856\times 10^{-36})^{7.5}+1.37593\times 10^{17}\,(1.6856\times 10^{-36})^{6.5}\right)\right)\,\hat{}\,(1/1152)$$

Result:

1.64532… +
0.00175983… i

Polar coordinates:

$r = 1.64532$ (radius), $\theta = 0.0612836°$ (angle)

$1.64532 \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 \ldots$

1+((((12 (-1.41604×10^89 (1.6856e-36)^8.5 + 1.57058×10^53 (1.6856e-36)^7.5 + 1.37593×10^17 (1.6856e-36)^6.5)))))^1/1024

Input interpretation:

$$1 + \left(12\left(-1.41604 \times 10^{89} \left(1.6856 \times 10^{-36}\right)^{8.5} + 1.57058 \times 10^{53} \left(1.6856 \times 10^{-36}\right)^{7.5} + 1.37593 \times 10^{17} \left(1.6856 \times 10^{-36}\right)^{6.5}\right)\right) \wedge (1/1024)$$

Result:

1.61093… +
0.00187433… i

Polar coordinates:

$r = 1.61093$ (radius), $\theta = 0.0666638°$ (angle)

1.61093 result that is a very good approximation to the value of the golden ratio 1.618033988749...

From:

$$\mathcal{A}_{nl} = \sum_{k=0}^{n+1} (-1)^{k+1} (2k - 1) \left\{ \frac{n+2}{n-1} \prod_{j=0}^{k-1} \frac{n+j}{n-j+1} \right\} \frac{\partial^{2k}}{\Box^{k}} \mathcal{F}^{(n+1)\,[k]} \,. \qquad (4.67)$$

For:

$$\Box = \frac{1}{c^2}\frac{\partial^2}{\partial t^2} - \frac{\partial^2}{\partial x^2} - \frac{\partial^2}{\partial y^2} - \frac{\partial^2}{\partial z^2}.$$

= 7.42794088341672 × 10^-34 ;   n = 2 ;   k = 2.5 ;   j = 1

we obtain:

(-1)^3.5 *4 [4*(2+1)/(2-1+1)] * fifth derivative x^7.5 * 1/(7.42794088341672 × 10^-34)^2.5

(-1)^3.5 * [4 (((4*(2+1)/(2-1+1))))] * [((((((4222.97 x^2.5) * 1/(7.42794088341672 × 10^-34)^2.5))))]

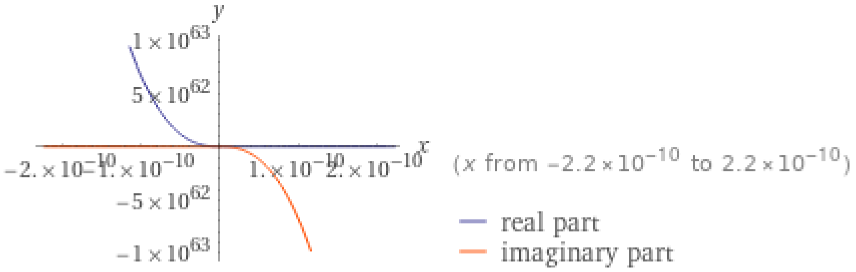
Input interpretation:

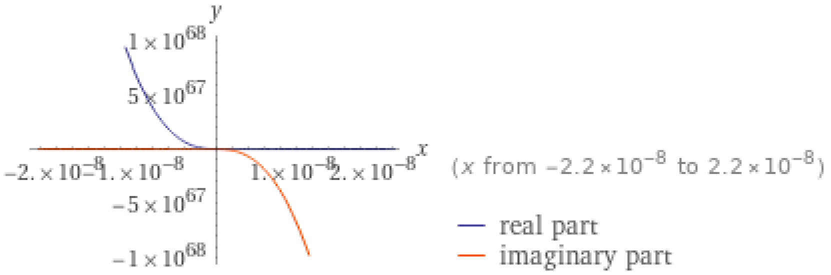
$$(-1)^{3.5}\left(4\left(4\times\frac{2+1}{2-1+1}\right)\right)\left(\left(4222.97\,x^{2.5}\right)\times\frac{1}{\left(7.42794088341672\times 10^{-34}\right)^{2.5}}\right)$$

Result:

$$\left(-2.88883\times 10^{72} - 6.73997\times 10^{87}\,i\right) x^{2.5}$$

Plots:





Alternate form:

$$\left(-6.73997\times 10^{87}\,i\right) x^{5/2}$$

Root:

$x = 0$

Properties as a real function:

Domain

$\{x \in \mathbb{R} : x \geq 0\}$ (all non-negative real numbers)

Range

$\emptyset$

$\mathbb{R}$ is the set of real numbers

$\emptyset$ is the set with no elements

Derivative:

$$\begin{gathered}
\frac{d}{dx}\big((-2\,888\,834\,712\,774\,649\,361\,918\,030\,609\,187\,654\,333\,617\,994\,674\,490\,593\,373\,\ddots \\
938\,195\,941\,531\,058\,176 - \\
6\,739\,972\,758\,844\,266\,672\,188\,367\,711\,883\,055\,179\,641\,766\,560\,325\,317\,\ddots \\
420\,422\,929\,414\,361\,600\,477\,985\,995\,409\,588\,224\,i)\,x^{2.5}\big) = \\
(-7\,222\,086\,781\,936\,623\,404\,795\,076\,522\,969\,135\,834\,044\,986\,686\,226\,483\,434\,845\,\ddots \\
489\,853\,827\,645\,440 - \\
16\,849\,931\,897\,110\,667\,563\,894\,451\,668\,899\,802\,740\,753\,166\,772\,272\,551\,\ddots \\
464\,799\,271\,973\,713\,480\,255\,768\,089\,170\,280\,448\,i)\,x^{1.5}
\end{gathered}$$

Indefinite integral:

$$\int \frac{(-1)^{3.5}\,(4\,(4\,(2+1)))\,\left(4222.97\,x^{2.5}\right)}{(2-1+1)\left(7.42794088341672\times 10^{-34}\right)^{2.5}}\,dx = \left(-8.25381\times 10^{71} - 1.92571\times 10^{87}\,i\right)x^{7/2} + \text{constant}$$

For $x = 2 * 10^{-10}$:

(-2.88883×10^72 - 6.73997×10^87 i) (2e-10)^2.5

Input interpretation:

$\left(-2.88883\times 10^{72} - 6.73997\times 10^{87}\,i\right)\left(2\times 10^{-10}\right)^{2.5}$

i is the imaginary unit

Result:

$$-1.63417\ldots \times 10^{48} - 3.81270\ldots \times 10^{63}\, i$$

Polar coordinates:

$r = 3.8127 \times 10^{63}$ (radius), $\theta = -90.°$ (angle)

$3.8127 * 10^{63}$

[(-2.88883×10^72 - 6.73997×10^87 i) (2e-10)^2.5]^1/(2^8+48)

Input interpretation:

$$\sqrt[2^8+48]{\left(-2.88883 \times 10^{72} - 6.73997 \times 10^{87}\, i\right)\left(2 \times 10^{-10}\right)^{2.5}}$$

i is the imaginary unit

Result:

$$1.618613\ldots - 0.008363598\ldots\, i$$

Polar coordinates:

$r = 1.61863$ (radius), $\theta = -0.296053°$ (angle)

1.61863 result that is a very good approximation to the value of the golden ratio 1.618033988749...

And

$$a_{k+1} \;=\; -\, a_k\, \frac{(2k+1)(n+k)}{(2k-1)(n-k+1)}\;, \qquad (4.68)$$

-24 (((2*2.5+1)(2+2.5)))/(((2*2.5-1)(2-2.5+1)))

Input:

$$-24 \times \frac{(2 \times 2.5 + 1)(2 + 2.5)}{(2 \times 2.5 - 1)(2 - 2.5 + 1)}$$

Result:

$$-324$$

-324 result very near to the value of Planck multipole spectrum data 319.73 with minus sign

From the previous expression:

$$(-1)^{3.5} (2 \times 2.5 - 1) \times 4 \times \frac{2 + 1}{2 - 1 + 1}$$

we obtain:

(((-24 (((2*2.5+1)(2+2.5)))/(((2*2.5-1)(2-2.5+1)))))) / ((((-1)^3.5 (2*2.5-1)*4*(2+1)/(2-1+1))))

Input:

$$\frac{-24 \times \frac{(2\times 2.5+1)(2+2.5)}{(2\times 2.5-1)(2-2.5+1)}}{(-1)^{3.5} (2 \times 2.5 - 1) \times 4 \times \frac{2+1}{2-1+1}}$$

Result:

$$-13.5\,i$$

Polar coordinates:

$r = 13.5$ (radius), $\theta = -90.°$ (angle)

13.5

From which:

64*2*[(((-24 (((2*2.5+1)(2+2.5)))/(((2*2.5-1)(2-2.5+1)))))) / ((((-1)^3.5 (2*2.5-1)*4*(2+1)/(2-1+1))))]-1i

Input:

$$64 \times 2 \times \frac{-24 \times \frac{(2\times 2.5+1)(2+2.5)}{(2\times 2.5-1)(2-2.5+1)}}{(-1)^{3.5} (2 \times 2.5 - 1) \times 4 \times \frac{2+1}{2-1+1}} - 1\,i$$

i is the imaginary unit

Result:

$-1729.\,i$

Polar coordinates:

$r = 1729$ (radius), $\theta = -90.°$ (angle)

1729

This result is very near to the mass of candidate glueball **f_0(1710) scalar meson.** Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

(((64*2*[(((-24 (((2*2.5+1)(2+2.5)))/(((2*2.5-1)(2-2.5+1)))))) / ((((-1)^3.5 (2*2.5-1)*4*(2+1)/(2-1+1))))]-1i)))^1/15

Input:

$$\sqrt[15]{64\times 2\times \frac{-24\times \frac{(2\times 2.5+1)\,(2+2.5)}{(2\times 2.5-1)\,(2-2.5+1)}}{(-1)^{3.5}\,(2\times 2.5-1)\times 4\times \frac{2+1}{2-1+1}}-1\,i}$$

i is the imaginary unit

Result:

$1.63481\ldots -$
$0.171825\ldots\, i$

Polar coordinates:

$r = 1.64382$ (radius), $\theta = -6.°$ (angle)

$1.64382 \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

From:

Ghost-free *F (R)* bigravity and accelerating cosmology

Shin'ichi Nojiri , Sergei D. Odintsov - Physics Letters B 716 (2012) 377–383

"The formulation of massive spin-two field or massive graviton has a long history initiated from the free field formulation by Fierz and Pauli. In spite of the success of the free theory, it has been known that there appears the Boulware–Deser ghost in the naive non-linear extension of the Fierz–Pauli formulation. Furthermore, it has been also known that there appears a discontinuity in the limit of m → 0 in the free massive gravity compared with the Einstein gravity. This discontinuity is due to the extra degrees of freedom in the limit and is called vDVZ (van Dam, Veltman, and Zakharov) discontinuity. The extra degrees of freedom can be screened by the non-linearity, which becomes strong when m is small. Such mechanism is called the Vainstein mechanism. A similar mechanism works for the bending mode of the so-called DGP model. Moreover, the scalar field models, where the Vainshtein mechanism works, have been proposed. In this letter, we propose a bigravity analogue of the F (R) gravity. We formulate the theory which respects the desirable properties of the recent bigravity models and for example, the Boulware–Deser ghost does not appear. It is demonstrated that the obtained field equations are consistent with each other and consistent cosmological solutions can be obtained. Furthermore, we show that a wide class of the cosmological solutions, including the accelerated expanding universe, can be realized in this formulation".

We have that:

M^2_{eff} = (2.435e+18)^2 ; n = 2 ; t = 1/24 ; m = 3

$$\sigma(t) = \frac{\frac{144 M_f^2 n^2}{m^2 M_{\mathrm{eff}}^2 t^4}\left(1 + \frac{2n^2}{m^2 M_{\mathrm{eff}}^2 t^2}\right)}{\left(1 + \frac{6n^2}{m^2 M_{\mathrm{eff}}^2 t^2}\right)^2} - \frac{12n^2}{t^2}, \tag{59}$$

$$\tilde{U}(t) = -\frac{\frac{72 n^2 M_f^2}{m^2 M_{\mathrm{eff}}^2 t^4}\left(1 + \frac{14n^2}{m^2 M_{\mathrm{eff}}^2 t^2}\right)}{\left(1 + \frac{6n^2}{m^2 M_{\mathrm{eff}}^2 t^2}\right)^2} + m^2 M_{\mathrm{eff}}^2 \left(4 + \frac{42n^2}{m^2 M_{\mathrm{eff}}^2 t^2}\right). \tag{60}$$

When t is small, $\sigma(t)$ behaves as

$$\sigma(t) \sim \left(\frac{8M_f^2}{m^2 M_{\mathrm{eff}}^2} - 12n^2\right)\frac{1}{t^2}. \tag{61}$$

In order to avoid the ghost, we require $\sigma(t) > 0$, which gives a constraint for the parameters as follows:

$$\frac{2M_f^2}{m^2 M_{\mathrm{eff}}^2} > 3n^2. \tag{62}$$

2x/((9*(2.435e+18)^2)) > 3*2^2

Input interpretation:

$$2\times\frac{x}{9\left(2.435\times10^{18}\right)^2}>3\times2^2$$

Result:

$3.74791\times10^{-38}\,x>12$

Alternate forms:

$x>3.20178\times10^{38}$

$3.74791\times10^{-38}\,x>12$

Alternate form assuming x is real:

$3.74791\times10^{-38}\,x+0>12$

Solution:

$x>3.20178\times10^{38}$

x = 3.4 * 10^{38}

$$\sigma(t)=\frac{\frac{144M_f^2n^2}{m^2M_{\text{eff}}^2t^4}\left(1+\frac{2n^2}{m^2M_{\text{eff}}^2t^2}\right)}{\left(1+\frac{6n^2}{m^2M_{\text{eff}}^2t^2}\right)^2}-\frac{12n^2}{t^2},$$

((144*3.4e+38*4))/(((9*((2.435e+18)^2)*(1/24)^4))*(1+(2*4)/(((9*(2.435e+18)^2*(1/24)^2)))*1/(((1+(6*4)/(((9*(2.435e+18)^2*(1/24)^2)))))^2-(12*4)/(1/24)^2

(((((144*3.4e+38*4))/(((9*((2.435e+18)^2)*(1/24)^4)))))*(1+(2*4)/(((9*(2.435e+18)^2*(1/24)^2)))))

Input interpretation:

$$\frac{144\times 3.4\times 10^{38}\times 4}{9\left(2.435\times 10^{18}\right)^2\left(\frac{1}{24}\right)^4}\left(1+\frac{2\times 4}{9\left(2.435\times 10^{18}\right)^2\left(\frac{1}{24}\right)^2}\right)$$

Result:

$1.2176036092406680468358006316171170133386821939160750317166 1\ldots\times 10^9$

$1.217603609\ldots*10^9$

1.217603609240668 × 10^9(((1/(((1+(6*4)/(((9*(2.435e+18)^2*(1/24)^2)))))^2)))-((((12*4)/(1/24)^2))))

Input interpretation:

$$1.217603609240668\times 10^9\left(\frac{1}{\left(1+\frac{6\times 4}{9\left(2.435\times 10^{18}\right)^2\left(\frac{1}{24}\right)^2}\right)^2}-\frac{12\times 4}{\left(\frac{1}{24}\right)^2}\right)$$

Result:

$-3.36630869846767481960000000000000000006308545025002984531 7\ldots\times 10^{13}$

$-3.366308698\ldots*10^{13}$

$$\tilde{U}(t)=-\frac{\frac{72n^2M_f^2}{m^2M_{\rm eff}^2t^4}\left(1+\frac{14n^2}{m^2M_{\rm eff}^2t^2}\right)}{\left(1+\frac{6n^2}{m^2M_{\rm eff}^2t^2}\right)^2}+m^2M_{\rm eff}^2\left(4+\frac{42n^2}{m^2M_{\rm eff}^2t^2}\right).$$

-((72*4*3.4e+38))/(((9*((2.435e+18)^2)*(1/24)^4))*(1+(14*4)/(((9*(2.435e+18)^2*(1/24)^2))))*1/(((1+(6*4)/(((9*(2.435e+18)^2*(1/24)^2))))))^2

Input interpretation:

$$-\frac{72\times 4\times 3.4\times 10^{38}}{9\left(2.435\times 10^{18}\right)^2\left(\frac{1}{24}\right)^4}\left(1+\frac{14\times 4}{9\left(2.435\times 10^{18}\right)^2\left(\frac{1}{24}\right)^2}\right)\times\frac{1}{\left(1+\frac{6\times 4}{9\left(2.435\times 10^{18}\right)^2\left(\frac{1}{24}\right)^2}\right)^2}$$

Result:

$-6.0880180462033402341790031580855850666934109695803751585830\ldots\times 10^8$

$-6.08801804\ldots*10^8$

9*(2.435e+18)^2(4+((42*4))/((9*(2.435e+18)*(1/24)^2)))

Input interpretation:

$$9\left(2.435\times 10^{18}\right)^2\left(4+\frac{42\times 4}{9\times 2.435\times 10^{18}\left(\frac{1}{24}\right)^2}\right)$$

Result:

213 452 100 000 000 235 630 080 000 000 000 000 000

Scientific notation:

$2.134521000000000235630 08\times 10^{38}$

$2.13452100000000023563008 * 10^{38}$

-((72*4*3.4e+38))/(((9*((2.435e+18)^2)*(1/24)^4)))*(1+(14*4)/(((9*(2.435e+18)^2*(1/24)^2))))*1/(((1+(6*4)/(((9*(2.435e+18)^2*(1/24)^2))))))^2+2.13452100000000023563008e+38

Input interpretation:

$$-\frac{72\times 4\times 3.4\times 10^{38}}{9\left(2.435\times 10^{18}\right)^2\left(\frac{1}{24}\right)^4}\left(1+\frac{14\times 4}{9\left(2.435\times 10^{18}\right)^2\left(\frac{1}{24}\right)^2}\right)\times\frac{1}{\left(1+\frac{6\times 4}{9\left(2.435\times 10^{18}\right)^2\left(\frac{1}{24}\right)^2}\right)^2}+2.13452100000000023563008\times 10^{38}$$

Result:

$2.134521000000000235630079999999391198195379665976582099684191\ldots \times 10^{38}$

2.134521…*10^{38}

(((1.217603609240668 × 10^9(((1/(((1+(6*4)/(((9*(2.435e+18)^2*(1/24)^2)))))^2)))-((((12*4)/(1/24)^2)))))))^3 / (2.134521000000000023563007999 × 10^38)

Input interpretation:

$$\frac{\left(1.217603609240668\times 10^{9}\left(\frac{1}{\left(1+\frac{6\times 4}{9\,(2.435\times 10^{18})^{2}\left(\frac{1}{24}\right)^{2}}\right)^{2}}-\frac{12\times 4}{\left(\frac{1}{24}\right)^{2}}\right)\right)^{3}}{2.134521000000000023563007999\times 10^{38}}$$

Result:

$-178.7151566018032568913559600951407183391426862990258247958448545\ldots$

-178.7151566…. result very near to the value of Planck multipole spectrum data 179.33 with minus sign

22*1/sqrt[-(((1.217603609240668 × 10^9(((1/(((1+(6*4)/(((9*(2.435e+18)^2*(1/24)^2)))))^2)))-((((12*4)/(1/24)^2)))))))^3 / (2.134521000000000023563007999 × 10^38)]

Input interpretation:

$$22\times\frac{1}{\sqrt{-\frac{\left(1.217603609240668\times 10^{9}\left(\frac{1}{\left(1+\frac{6\times 4}{9\,(2.435\times 10^{18})^{2}\left(\frac{1}{24}\right)^{2}}\right)^{2}}-\frac{12\times 4}{\left(\frac{1}{24}\right)^{2}}\right)\right)^{3}}{2.134521000000000023563007999\times 10^{38}}}}$$

Result:

1.645667103614292…

$1.645667103614292\ldots. \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

From:

$$K = \frac{-\frac{12n^2}{m^2 M_{\text{eff}}^2 t^3}}{1 + \frac{6n^2}{m^2 M_{\text{eff}}^2 t^2}}, \qquad \dot{K} = \frac{\frac{36n^2}{m^2 M_{\text{eff}}^2 t^4}\left(1 + \frac{2n^2}{m^2 M_{\text{eff}}^2 t^2}\right)}{\left(1 + \frac{6n^2}{m^2 M_{\text{eff}}^2 t^2}\right)^2}.$$

-(12*4)/(((9*(2.435e+18)^2*(1/24)^3)))*1/(((1+(6*4)/(((9*(2.435e+18)^2*(1/24)^2)))))))

Input interpretation:

$$-\frac{12\times 4}{9\left(2.435\times 10^{18}\right)^2\left(\frac{1}{24}\right)^3}\times\frac{1}{1+\frac{6\times 4}{9\left(2.435\times 10^{18}\right)^2\left(\frac{1}{24}\right)^2}}$$

Result:

$-1.24346773819512668181760685418414684719057788029386922037\ldots\times 10^{-32}$

$-1.243467738\ldots*10^{-32}$

((36*4))/(((9*((2.435e+18)^2)*(1/24)^4)))*(1+(2*4)/(((9*(2.435e+18)^2*(1/24)^2))))*1/(((1+(6*4)/(((9*(2.435e+18)^2*(1/24)^2))))))^2

Input interpretation:

$$\frac{36\times 4}{9\left(2.435\times 10^{18}\right)^2\left(\frac{1}{24}\right)^4}\left(1+\frac{2\times 4}{9\left(2.435\times 10^{18}\right)^2\left(\frac{1}{24}\right)^2}\right)\times\frac{1}{\left(1+\frac{6\times 4}{9\left(2.435\times 10^{18}\right)^2\left(\frac{1}{24}\right)^2}\right)^2}$$

Result:

$8.952967715004912109086769350125855753560144806011747022228 1\ldots \times 10^{-31}$

8.952967715004912…*10^{-31}

8.952967715004912× 10^-31 / [-(12*4)/(((9*(2.435e+18)^2*(1/24)^3)))*1/(((1+(6*4)/(((9*(2.435e+18)^2*(1/24)^2))))))]

Input interpretation:

$$\frac{8.952967715004912\times 10^{-31}}{-\frac{12\times 4}{9\left(2.435\times 10^{18}\right)^2\left(\frac{1}{24}\right)^3}\times \frac{1}{1+\frac{6\times 4}{9\left(2.435\times 10^{18}\right)^2\left(\frac{1}{24}\right)^2}}}$$

Result:

$-71.9999999999999991227213541666666853186827395935666666666666666\ldots$

Repeating decimal:

$-71.99999999999999912272135416666668531868273959356\overline{6}$

(period 1)

-71.99999 ≈ -72

From which:

-24(((8.952967715004912× 10^-31 / [-(12*4)/(((9*(2.435e+18)^2*(1/24)^3)))*1/(((1+(6*4)/(((9*(2.435e+18)^2*(1/24)^2))))))])))+1

Input interpretation:

$$-24\times \frac{8.952967715004912\times 10^{-31}}{-\frac{12\times 4}{9\left(2.435\times 10^{18}\right)^2\left(\frac{1}{24}\right)^3}\times \frac{1}{1+\frac{6\times 4}{9\left(2.435\times 10^{18}\right)^2\left(\frac{1}{24}\right)^2}}}+1$$

Result:

1728.99999999999997894531250000000044764838575024 56

1729

This result is very near to the mass of candidate glueball **f_0(1710) scalar meson.** Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

(((-24(((8.952967715004912× 10^-31 / [-(12*4)/(((9*(2.435e+18)^2*(1/24)^3)))*1/(((1+(6*4)/(((9*(2.435e+18)^2*(1/24)^2))))))]))))+1)))^1/15

Input interpretation:

$$\sqrt[15]{-24\times\frac{8.952967715004912\times10^{-31}}{-\frac{12\times4}{9\left(2.435\times10^{18}\right)^2\left(\frac{1}{24}\right)^3}\times\frac{1}{1+\frac{6\times4}{9\left(2.435\times10^{18}\right)^2\left(\frac{1}{24}\right)^2}}}+1}$$

Result:

1.6438152287487281…

$1.6438152287…. \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934 ...$

[(((-24(((8.952967715004912× 10^-31 / [-(12*4)/(((9*(2.435e+18)^2*(1/24)^3)))*1/(((1+(6*4)/(((9*(2.435e+18)^2*(1/24)^2))))))]))))+1)))^1/15-1]^1/32

Input interpretation:

$$\sqrt[32]{\sqrt[15]{-24\times\frac{8.952967715004912\times10^{-31}}{-\frac{12\times4}{9\left(2.435\times10^{18}\right)^2\left(\frac{1}{24}\right)^3}\times\frac{1}{1+\frac{6\times4}{9\left(2.435\times10^{18}\right)^2\left(\frac{1}{24}\right)^2}}}+1}-1}$$

Result:

0.986333511553779453…

0.986333511…

From the algebraic sum with the previous expression, we obtain:

(((1.217603609240668 × 10^9(((1/(((1+(6*4)/(((9*(2.435e+18)^2*(1/24)^2)))))^2)))-((((12*4)/(1/24)^2))))))^3 / (2.134521000000000023563007999 × 10^38)-71.99999999999999991227213541666

Input interpretation:

$$\frac{\left(1.217603609240668\times 10^{9}\left(\frac{1}{\left(1+\frac{6\times 4}{9\left(2.435\times 10^{18}\right)^{2}\left(\frac{1}{24}\right)^{2}}\right)^{2}}-\frac{12\times 4}{\left(\frac{1}{24}\right)^{2}}\right)\right)^{3}}{2.134521000000000023563007999\times 10^{38}}-71.99999999999999991227213541666$$

Result:

−250.7151566018032560140773142617407183391426862990258247958448545…

-250.7151566… result very near to the value of Planck multipole spectrum data 250.1 with minus sign

From which:

-6*10^2((((1.21760360924 × 10^9(((1/(((1+(6*4)/(((9*(2.435e+18)^2*(1/24)^2)))))^2)))-((((12*4)/(1/24)^2)))))))^3 / (2.134521 × 10^38)-71.99999)+373.95

Input interpretation:

$$-6\times 10^{2}\left(\frac{\left(1.21760360924\times 10^{9}\left(\frac{1}{\left(1+\frac{6\times 4}{9\left(2.435\times 10^{18}\right)^{2}\left(\frac{1}{24}\right)^{2}}\right)^{2}}-\frac{12\times 4}{\left(\frac{1}{24}\right)^{2}}\right)\right)^{3}}{2.134521\times 10^{38}}-71.99999\right)+$$

$$373.95$$

Result:

150803.03796090558887562608842300789641113299799261572965932935927…

150803.0379609… result very near to the total sum of Planck multipole spectrum data 150802.7363

From:

Here $R^{(g)}$ is the scalar curvature for $g_{\mu\nu}$ and $R^{(f)}$ is the scalar curvature for $f_{\mu\nu}$. The tensor $\sqrt{g^{-1}f}$ is defined by the square root of $g^{\mu\rho}f_{\rho\nu}$, that is, $(\sqrt{g^{-1}f}\,)^{\mu}{}_{\rho}(\sqrt{g^{-1}f}\,)^{\rho}{}_{\nu}=g^{\mu\rho}f_{\rho\nu}$. For the tensor $X^{\mu}{}_{\nu}$, $e_n(X)$'s are defined by

$$e_0(X)=1,\qquad e_1(X)=[X],\qquad e_2(X)=\frac{1}{2}([X]^2-[X^2]),$$
$$e_3(X)=\frac{1}{6}([X]^3-3[X][X^2]+2[X^3]),$$
$$e_4(X)=\frac{1}{24}([X]^4-6[X]^2[X^2]+3[X^2]^2+8[X][X^3]-6[X^4]),$$
$$e_k(X)=0\quad \text{for } k>4. \tag{2}$$

$$
\begin{aligned}
&F\left(R^{(g)}, e_n\left(\sqrt{g^{-1}f}\right)\right) \\
&\equiv \left(\frac{e_1(\sqrt{g^{-1}f})}{8e_0(\sqrt{g^{-1}f})}\right. \\
&\quad \pm \left.\sqrt{\frac{e_1(\sqrt{g^{-1}f})^2}{64e_0(\sqrt{g^{-1}f})^2} - \frac{M_g^2 e^{-\varphi}(R^{(g)}+V_0)}{12m^2 M_{\text{eff}}^2 e^{-2\varphi} e_0(\sqrt{g^{-1}f})}}\right)^2 R^{(g)} \\
&\quad + \left(\frac{e_1(\sqrt{g^{-1}f})}{8e_0(\sqrt{g^{-1}f})}\right. \\
&\quad \pm \left.\sqrt{\frac{e_1(\sqrt{g^{-1}f})^2}{64e_0(\sqrt{g^{-1}f})^2} - \frac{M_g^2 e^{-\varphi}(R^{(g)}+V_0)}{12m^2 M_{\text{eff}}^2 e^{-2\varphi} e_0(\sqrt{g^{-1}f})}}\right)^4 \\
&\quad \times V\left(-2\ln\left(\frac{e_1(\sqrt{g^{-1}f})}{8e_0(\sqrt{g^{-1}f})}\right.\right. \\
&\quad \pm \left.\left.\sqrt{\frac{e_1(\sqrt{g^{-1}f})^2}{64e_0(\sqrt{g^{-1}f})^2} - \frac{M_g^2 e^{-\varphi}(R^{(g)}+V_0)}{12m^2 M_{\text{eff}}^2 e^{-2\varphi} e_0(\sqrt{g^{-1}f})}}\right)\right).
\end{aligned}
\tag{14}
$$

For:

$\sqrt{(g^{-1} f)} = -1$; $M_g^2 = 3.4e+38$; $M_{eff}^2 = (2.435e+18)^2$; $\varphi = 0.9991104684$; m = 3

Where 0.9991104684 is the value of the following Rogers-Ramanujan continued fraction:

$$
\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\dfrac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1} = 1-\cfrac{e^{-\pi\sqrt{5}}}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-3\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+\dots}}}} \approx 0.9991104684
$$

Here $R^{(g)}$ is the scalar curvature for $g_{\mu\nu}$

with a constant V_0.

$R^{(g)} = 2$; $V_0 = \mu = 1.451369234$; $e_0(X) = 1,$ $e_1(X) = [X],$ = - 1

$$F\left(R^{(g)}, e_n\left(\sqrt{g^{-1}f}\right)\right) \equiv \left(\frac{e_1(\sqrt{g^{-1}f}\,)}{8e_0(\sqrt{g^{-1}f}\,)} \pm \sqrt{\frac{e_1(\sqrt{g^{-1}f}\,)^2}{64e_0(\sqrt{g^{-1}f}\,)^2} - \frac{M_g^2 \mathrm{e}^{-\varphi}(R^{(g)}+V_0)}{12m^2 M_{\mathrm{eff}}^2 \mathrm{e}^{-2\varphi} e_0(\sqrt{g^{-1}f}\,)}}\right)^2 R^{(g)}$$

(((((([-1/8+sqrt(((((1/64-((((((((3.4e+38)*e^(-0.9991104684)*(2+1.451369234))))) / (((12*9*(2.435e+18)^2*e^(-2*0.9991104684)))))))))))])))))^2 * 2

Input interpretation:

$$\left(-\frac{1}{8}+\sqrt{\frac{1}{64}-\frac{\frac{3.4\times10^{38}\,(2+1.451369234)}{e^{0.9991104684}}}{12\times9\,(2.435\times10^{18})^2\,e^{-2\times0.9991104684}}}\right)^2\times2$$

Result:

$-9.89125193\ldots -$
$1.11369329\ldots\, i$

Polar coordinates:

$r = 9.95375$ (radius), $\theta = -173.576°$ (angle)

9.95375

$$+\left(\frac{e_1(\sqrt{g^{-1}f}\,)}{8e_0(\sqrt{g^{-1}f}\,)} \pm \sqrt{\frac{e_1(\sqrt{g^{-1}f}\,)^2}{64e_0(\sqrt{g^{-1}f}\,)^2} - \frac{M_g^2 \mathrm{e}^{-\varphi}(R^{(g)}+V_0)}{12m^2 M_{\mathrm{eff}}^2 \mathrm{e}^{-2\varphi} e_0(\sqrt{g^{-1}f}\,)}}\,\right)^4$$

(((((([-1/8+sqrt(((((1/64-((((((((3.4e+38)*e^(-0.9991104684)*(2+1.451369234))))) / (((12*9*(2.435e+18)^2*e^(-2*0.9991104684)))))))))))]))))))^4

Input interpretation:

$$\left(-\frac{1}{8}+\sqrt{\frac{1}{64}-\frac{\frac{3.4\times 10^{38}\,(2+1.451369234)}{e^{0.9991104684}}}{12\times 9\,(2.435\times 10^{18})^2\, e^{-2\times 0.9991104684}}}\right)^4$$

Result:

24.1491380… +
5.50791044… i

Polar coordinates:

$r = 24.7693$ (radius), $\theta = 12.8482°$ (angle)

24.7693

$$\times V\left(-2\ln\left(\frac{e_1(\sqrt{g^{-1}f}\,)}{8e_0(\sqrt{g^{-1}f}\,)} \pm \sqrt{\frac{e_1(\sqrt{g^{-1}f}\,)^2}{64e_0(\sqrt{g^{-1}f}\,)^2} - \frac{M_g^2 \mathrm{e}^{-\varphi}(R^{(g)}+V_0)}{12m^2 M_{\mathrm{eff}}^2 \mathrm{e}^{-2\varphi} e_0(\sqrt{g^{-1}f}\,)}}\,\right)\right).$$

1.451369234 *((((-2ln(-1/8+sqrt(((((1/64-((((((((3.4e+38)*e^(-0.9991104684)*(2+1.451369234))))) / (((12*9*(2.435e+18)^2*e^(-2*0.9991104684))))))))))))))))

Input interpretation:

$$1.451369234\left(-2\log\left(-\frac{1}{8}+\sqrt{\frac{1}{64}-\frac{\frac{3.4\times10^{38}\,(2+1.451369234)}{e^{0.9991104684}}}{12\times9\left(2.435\times10^{18}\right)^{2}\,e^{-2\times0.9991104684}}}\right)\right)$$

log(x) is the natural logarithm

Result:

$-2.329160797\ldots-4.722340697\ldots\,i$

Polar coordinates:

$r = 5.2655$ (radius), $\theta = -116.254°$ (angle)

5.2655

(14.2578861 + 4.39421715 i)*((((((1.451369234 *((((-2ln(-1/8+sqrt(((((1/64-((((((((3.4e+38)*e^(-0.9991104684)*(2+1.451369234))))) / (((12*9*(2.435e+18)^2*e^(-2*0.9991104684))))))))))))))))))))))

Input interpretation:

$$(14.2578861+4.39421715\,i)\left(1.451369234\left(-2\log\left(-\frac{1}{8}+\sqrt{\frac{1}{64}-\frac{\frac{3.4\times10^{38}\,(2+1.451369234)}{e^{0.9991104684}}}{12\times9\left(2.435\times10^{18}\right)^{2}\,e^{-2\times0.9991104684}}}\right)\right)\right)$$

log(x) is the natural logarithm

i is the imaginary unit

Result:

$-12.4579189\ldots - 77.5654341\ldots i$

Polar coordinates:

$r = 78.5595$ (radius), $\theta = -99.1244°$ (angle)

78.5595

(((-9.89125193 - 1.11369329 i)+(24.1491380 +5.50791044 i)))*(-2.329160797 - 4.722340697 i)

Input interpretation:

$$((-9.89125193 + i \times (-1.11369329)) + (24.1491380 + 5.50791044\, i))\,(-2.329160797 + i \times (-4.722340697))$$

i is the imaginary unit

Result:

$-12.4579188\ldots - 77.5654340\ldots i$

Polar coordinates:

$r = 78.5595$ (radius), $\theta = -99.1244°$ (angle)

78.5595

128/[(14.2578861 + 4.39421715 i)((((((1.451369234((((-2ln(-1/8+sqrt(((((1/64-((((((((3.4e+38)e^(-0.9991104684)*(2+1.451369234)))))/(((12*9*(2.435e+18)^2*e^(-2*0.9991104684))))))))))))))))))))))]

Where 128 = 64*2

Input interpretation:

$$128\Bigg/\left((14.2578861+4.39421715\,i)\left(1.451369234\left(-2\log\left(-\frac{1}{8}+\sqrt{\frac{1}{64}-\frac{\frac{3.4\times10^{38}\,(2+1.451369234)}{e^{0.9991104684}}}{12\times9\,(2.435\times10^{18})^{2}\,e^{-2\times0.9991104684}}}\right)\right)\right)\right)$$

log(x) is the natural logarithm

i is the imaginary unit

Result:

$-0.25837944\ldots +$
$1.6087208\ldots\, i$

Polar coordinates:

$r = 1.62934$ (radius), $\theta = 99.1244°$ (angle)

1.62934 result very near to the mean between ζ(2) = $\frac{\pi^2}{6}$ = 1.644934 ... and the value of golden ratio 1.61803398…, i.e. 1.63148399

Furthermore, from the principal expression, we obtain also:

1/5(((-9.89125193 - 1.11369329 i)+(24.1491380 +5.50791044 i)))*(-2.329160797 - 4.722340697 i)

Input interpretation:

$$\frac{1}{5}\left(\left(-9.89125193+i\times(-1.11369329)\right)+\left(24.1491380+5.50791044\,i\right)\right)$$
$$\left(-2.329160797+i\times(-4.722340697)\right)$$

i is the imaginary unit

Result:

$-2.49158376\ldots -$
$15.5130868\ldots\,i$

Polar coordinates:

$r = 15.7119$ (radius), $\theta = -99.1244°$ (angle)

15.7119 result very near to the S_{BH} black hole entropy 15.6730

From:

$$e^{-\frac{\varphi}{2}} = \frac{e_1(\sqrt{g^{-1}f}\,)}{8e_0(\sqrt{g^{-1}f}\,)} \pm \sqrt{\frac{e_1(\sqrt{g^{-1}f}\,)^2}{64e_0(\sqrt{g^{-1}f}\,)^2} - \frac{M_g^2 e^{-\varphi}(R^{(g)}+V_0)}{12m^2 M_{\text{eff}}^2 e^{-2\varphi} e_0(\sqrt{g^{-1}f}\,)}}, \qquad (13)$$

(((((([-1/8+sqrt(((((1/64-((((((((3.4e+38)*e^(-0.9991104684)*(2+1.451369234))))) / (((12*9*(2.435e+18)^2*e^(-2*0.9991104684)))))))))))])))))

Input interpretation:

$$-\frac{1}{8}+\sqrt{\frac{1}{64}-\frac{\frac{3.4\times10^{38}\,(2+1.451369234)}{e^{0.9991104684}}}{12\times9\left(2.435\times10^{18}\right)^2 e^{-2\times0.9991104684}}}$$

Result:

$-0.125 +$
$2.227386577\ldots i$

Polar coordinates:

$r = 2.23089$ (radius), $\theta = 93.212°$ (angle)

(((((((([-1/8+sqrt(((((1/64-((((((((3.4e+38)*e^(-0.9991104684)*(2+1.451369234))))) / (((12*9*(2.435e+18)^2*e^(-2*0.9991104684))))))))))))])))))))^6-5

Input interpretation:

$$\left(-\frac{1}{8}+\sqrt{\frac{1}{64}-\frac{\frac{3.4\times10^{38}\,(2+1.451369234)}{e^{0.9991104684}}}{12\times9\left(2.435\times10^{18}\right)^2 e^{-2\times0.9991104684}}}\right)^6-5$$

Result:

$-121.365542\ldots -$
$40.6874313\ldots i$

Polar coordinates:

$r = 128.004$ (radius), $\theta = -161.466°$ (angle)

128.004 ≈ 128 = 64*2

27*1/2*(((((((((([-1/8+sqrt(((((1/64-((((((((3.4e+38)*e^(-0.9991104684)*(2+1.451369234))))) / (((12*9*(2.435e+18)^2*e^(-2*0.9991104684)))))))))))])))))))^6-5))-1

Input interpretation:

$$27\times\frac{1}{2}\left(\left(-\frac{1}{8}+\sqrt{\frac{1}{64}-\frac{\frac{3.4\times10^{38}\,(2+1.451369234)}{e^{0.9991104684}}}{12\times9\left(2.435\times10^{18}\right)^2 e^{-2\times0.9991104684}}}\right)^6-5\right)-1$$

Result:

$-1639.43482\ldots-549.280323\ldots i$

Polar coordinates:

$r = 1729.$ (radius), $\theta = -161.477°$ (angle)

1729

This result is very near to the mass of candidate glueball **f_0(1710) scalar meson.** Furthermore, 1728 occurs in the algebraic formula for the j-invariant of an elliptic curve. The number 1728 is one less than the Hardy–Ramanujan number 1729 (taxicab number)

[27*1/2*(((((((((([-1/8+sqrt(((((1/64-((((((((3.4e+38)*e^(-0.9991104684)*(2+1.451369234))))) / (((12*9*(2.435e+18)^2*e^(-2*0.9991104684)))))))))))])))))))^6-5))-1]^1/15

Input interpretation:

$$\sqrt[15]{27\times\frac{1}{2}\left(\left(-\frac{1}{8}+\sqrt{\frac{1}{64}-\frac{\frac{3.4\times10^{38}\,(2+1.451369234)}{e^{0.9991104684}}}{12\times9\left(2.435\times10^{18}\right)^2 e^{-2\times0.9991104684}}}\right)^6-5\right)-1}$$

Result:

1.614886158… −
0.3070375732… i

Polar coordinates:

$r = 1.64382$ (radius), $\theta = -10.7651°$ (angle)

$1.64382 \approx \zeta(2) = \frac{\pi^2}{6} = 1.644934\ldots$

(([27*1/2*(((((((((([-1/8+sqrt(((((1/64-((((((((3.4e+38)*e^(-0.9991104684)*(2+1.451369234))))) / (((12*9*(2.435e+18)^2*e^(-2*0.9991104684)))))))))))])))))))^6-5))-1]^1/15-1))^1/32

Input interpretation:

$$\sqrt[32]{\sqrt[15]{27\times\frac{1}{2}\left(\left(\left(-\frac{1}{8}+\sqrt{\frac{1}{64}-\frac{\frac{3.4\times10^{38}\,(2+1.451369234)}{e^{0.9991104684}}}{12\times9\left(2.435\times10^{18}\right)^2 e^{-2\times0.9991104684}}}\right)^6-5\right)\right)-1}-1}$$

Result:

0.98824583209… −
0.014303382898… i

Polar coordinates:

$r = 0.988349$ (radius), $\theta = -0.829213°$ (angle)

0.988349 result very near to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1} = 1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}} \approx 0.9991104684$$

and to the Omega mesons (ω/ω_3 | $5+3$ | $m_{u/d} = 255 - 390$ | $0.988 - 1.18$) Regge slope value (0.988) connected to the dilaton scalar field $\mathbf{0.989117352243 = \phi}$

A_1^{**} above the two low-lying pseudo-scalars. (bound states of gluons, or 'glueballs')

A_1^{**}	0.943(39) [2.5]	0.988(38)	0.152(53)
A_4	1.03(10) [2.5]	0.999(32)	0.035(21)

(**Glueball Regge trajectories -** *Harvey Byron Meyer*, Lincoln College -Thesis submitted for the degree of Doctor of Philosophy at the University of Oxford Trinity Term, 2004)

Note that

$$\sqrt[32]{\zeta(2)-1}$$

$$\sqrt[32]{\frac{\pi^2}{6}-1}$$

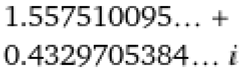
= 0.9863870313564812915…

sqrt[2(((((((([-1/8+sqrt(((((1/64-((((((((3.4e+38)*e^(-0.9991104684)*(2+1.451369234))))) / (((12*9*(2.435e+18)^2*e^(-2*0.9991104684)))))))))))]))))))^1/3]

Input interpretation:

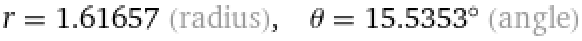
$$\sqrt{2\sqrt[3]{-\frac{1}{8}+\sqrt{\frac{1}{64}-\frac{\frac{3.4\times10^{38}\,(2+1.451369234)}{e^{0.9991104684}}}{12\times9\left(2.435\times10^{18}\right)^2 e^{-2\times0.9991104684}}}}}$$

Result:



$1.557510095\ldots +$
$0.4329705384\ldots i$

Polar coordinates:



$r = 1.61657$ (radius), $\theta = 15.5353^\circ$ (angle)

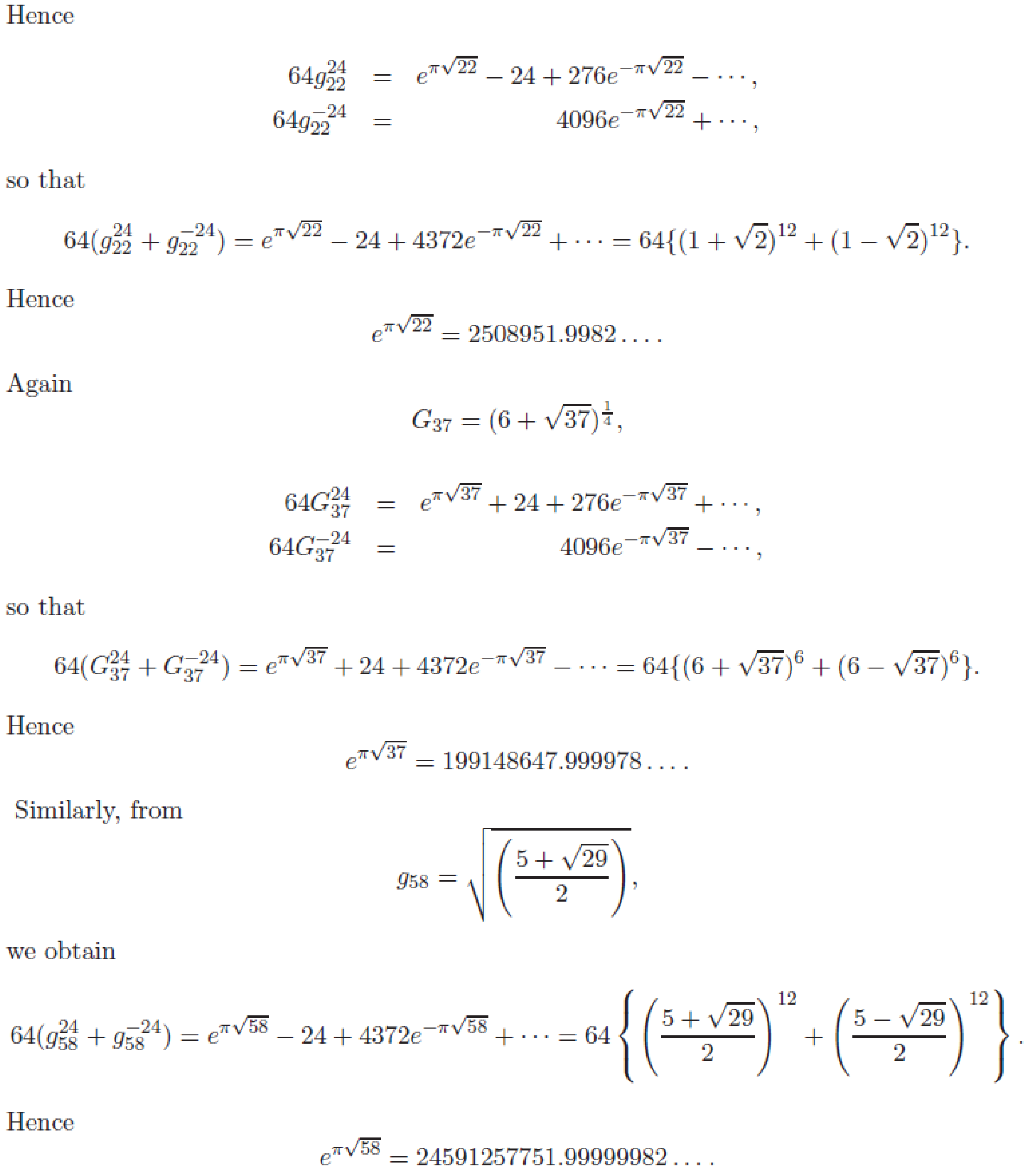
1.61657 result that is a very good approximation to the value of the golden ratio 1.618033988749...

Mathematical connections with some sectors of String Theory

From:

Modular equations and approximations to π - *Srinivasa Ramanujan*
Quarterly Journal of Mathematics, XLV, 1914, 350 – 372

We have that:



Hence

$$\begin{aligned} 64g_{22}^{24} &= e^{\pi\sqrt{22}} - 24 + 276e^{-\pi\sqrt{22}} - \cdots, \\ 64g_{22}^{-24} &= 4096e^{-\pi\sqrt{22}} + \cdots, \end{aligned}$$

so that

$$64(g_{22}^{24} + g_{22}^{-24}) = e^{\pi\sqrt{22}} - 24 + 4372e^{-\pi\sqrt{22}} + \cdots = 64\{(1+\sqrt{2})^{12} + (1-\sqrt{2})^{12}\}.$$

Hence

$$e^{\pi\sqrt{22}} = 2508951.9982\ldots.$$

Again

$$G_{37} = (6+\sqrt{37})^{\frac{1}{4}},$$

$$\begin{aligned} 64G_{37}^{24} &= e^{\pi\sqrt{37}} + 24 + 276e^{-\pi\sqrt{37}} + \cdots, \\ 64G_{37}^{-24} &= 4096e^{-\pi\sqrt{37}} - \cdots, \end{aligned}$$

so that

$$64(G_{37}^{24} + G_{37}^{-24}) = e^{\pi\sqrt{37}} + 24 + 4372e^{-\pi\sqrt{37}} - \cdots = 64\{(6+\sqrt{37})^{6} + (6-\sqrt{37})^{6}\}.$$

Hence

$$e^{\pi\sqrt{37}} = 199148647.999978\ldots.$$

Similarly, from

$$g_{58} = \sqrt{\left(\frac{5+\sqrt{29}}{2}\right)},$$

we obtain

$$64(g_{58}^{24} + g_{58}^{-24}) = e^{\pi\sqrt{58}} - 24 + 4372e^{-\pi\sqrt{58}} + \cdots = 64\left\{\left(\frac{5+\sqrt{29}}{2}\right)^{12} + \left(\frac{5-\sqrt{29}}{2}\right)^{12}\right\}.$$

Hence

$$e^{\pi\sqrt{58}} = 24591257751.99999982\ldots.$$

From:

An Update on Brane Supersymmetry Breaking
J. Mourad and A. Sagnotti - arXiv:1711.11494v1 [hep-th] 30 Nov 2017

From the following vacuum equations:

$$T\,e^{\gamma_E\,\phi} = -\,\frac{\beta_E^{(p)}\,h^2}{\gamma_E}\,e^{-2\,(8-p)\,C+2\,\beta_E^{(p)}\,\phi}$$

$$16\,k'\,e^{-2\,C} = \frac{h^2\left(p+1-\frac{2\,\beta_E^{(p)}}{\gamma_E}\right)e^{-2\,(8-p)\,C+2\,\beta_E^{(p)}\,\phi}}{(7-p)}$$

$$(A')^2 = k\,e^{-2\,A} + \frac{h^2}{16(p+1)}\left(7-p+\frac{2\,\beta_E^{(p)}}{\gamma_E}\right)e^{-2\,(8-p)\,C+2\,\beta_E^{(p)}\,\phi}$$

we have obtained, from the results almost equals of the equations, putting

$4096\,e^{-\pi\sqrt{18}}$ instead of

$$e^{-2\,(8-p)\,C+2\,\beta_E^{(p)}\,\phi}$$

a new possible mathematical connection between the two exponentials. Thence, also the values concerning p, C, β_E and ϕ correspond to the exponents of e (i.e. of exp). Thence we obtain for p = 5 and $\beta_E = 1/2$:

$$e^{-6C+\phi} = 4096e^{-\pi\sqrt{18}}$$

Therefore, with respect to the exponentials of the vacuum equations, the Ramanujan's exponential has a coefficient of 4096 which is equal to 642, while -6C+ϕ is equal to -$\pi\sqrt{18}$. From this it follows that it is possible to establish mathematically, the dilaton value.

For

exp((-Pi*sqrt(18))   we obtain:

Input:

$\exp\left(-\pi\sqrt{18}\right)$

Exact result:

$e^{-3\sqrt{2}\,\pi}$

Decimal approximation:

$1.6272016226072509292942156739117979541838581136954016\ldots \times 10^{-6}$

$1.6272016\ldots * 10^{-6}$

Property:

$e^{-3\sqrt{2}\,\pi}$ is a transcendental number

Series representations:

$$e^{-\pi\sqrt{18}} = e^{-\pi\sqrt{17}\sum_{k=0}^{\infty} 17^{-k}\binom{1/2}{k}}$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$e^{-\pi\sqrt{18}} = \exp\left(-\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now, we have the following calculations:

$$e^{-6C+\phi} = 4096e^{-\pi\sqrt{18}}$$

$$e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10\text{^-}6$$

from which:

$$\frac{1}{4096}e^{-6C+\phi} = 1.6272016\ldots * 10\text{^}{-6}$$

$$0.000244140625\, e^{-6C+\phi} = e^{-\pi\sqrt{18}} = 1.6272016\ldots * 10\text{^}{-6}$$

Now:

$$\ln\left(e^{-\pi\sqrt{18}}\right) = -13.328648814475 = -\pi\sqrt{18}$$

And:

(1.6272016* 10^-6) *1/ (0.000244140625)

Input interpretation:

$$\frac{1.6272016}{10^6} \times \frac{1}{0.000244140625}$$

Result:

0.0066650177536

0.006665017...

Thence:

$$0.000244140625\, e^{-6C+\phi} = e^{-\pi\sqrt{18}}$$

Dividing both sides by 0.000244140625, we obtain:

$$\frac{0.000244140625}{0.000244140625}e^{-6C+\phi} = \frac{1}{0.000244140625}e^{-\pi\sqrt{18}}$$

$$e^{-6C+\phi} = 0.0066650177536$$

((((exp((-Pi*sqrt(18)))))))*1/0.000244140625

Input interpretation:

$$\exp\left(-\pi\sqrt{18}\right)\times\frac{1}{0.000244140625}$$

Result:

0.00666501785...

0.00666501785…

Series representations:

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141}=4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}17^{-k}\binom{\frac{1}{2}}{k}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141}=4096\exp\left(-\pi\sqrt{17}\sum_{k=0}^{\infty}\frac{\left(-\frac{1}{17}\right)^k\left(-\frac{1}{2}\right)_k}{k!}\right)$$

$$\frac{\exp\left(-\pi\sqrt{18}\right)}{0.000244141}=4096\exp\left(-\frac{\pi\sum_{j=0}^{\infty}\operatorname{Res}_{s=-\frac{1}{2}+j}17^{-s}\,\Gamma\left(-\frac{1}{2}-s\right)\Gamma(s)}{2\sqrt{\pi}}\right)$$

Now:

$$e^{-6C+\phi}=0.0066650177536$$

$$\exp\left(-\pi\sqrt{18}\right)\times\frac{1}{0.000244140625}=$$

$$e^{-\pi\sqrt{18}}\times\frac{1}{0.000244140625}$$

$$=0.00666501785\ldots$$

From:

ln(0.00666501784619)

Input interpretation:

$\log(0.00666501784619)$

Result:

$-5.010882647757\ldots$

-5.010882647757…

Alternative representations:

$$\log(0.006665017846190000) = \log_e(0.006665017846190000)$$

$$\log(0.006665017846190000) = \log(a)\log_a(0.006665017846190000)$$

$$\log(0.006665017846190000) = -\text{Li}_1(0.993334982153810000)$$

Series representations:

$$\log(0.006665017846190000) = -\sum_{k=1}^{\infty} \frac{(-1)^k (-0.993334982153810000)^k}{k}$$

$$\log(0.006665017846190000) = 2 i \pi \left\lfloor \frac{\arg(0.006665017846190000 - x)}{2 \pi} \right\rfloor + \log(x) - \sum_{k=1}^{\infty} \frac{(-1)^k (0.006665017846190000 - x)^k x^{-k}}{k} \quad \text{for } x < 0$$

$$\log(0.006665017846190000) = \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2 \pi} \right\rfloor \log\left(\frac{1}{z_0}\right) + \log(z_0) + \left\lfloor \frac{\arg(0.006665017846190000 - z_0)}{2 \pi} \right\rfloor \log(z_0) - \sum_{k=1}^{\infty} \frac{(-1)^k (0.006665017846190000 - z_0)^k z_0^{-k}}{k}$$

Integral representation:

$$\log(0.006665017846190000) = \int_1^{0.006665017846190000} \frac{1}{t}\, dt$$

In conclusion:

$$-6C + \phi = -5.010882647757\ldots$$

and for C = 1, we obtain:

$\phi = -5.010882647757 + 6 =$ $\mathbf{0.989117352243 = \phi}$

Note that the values of n_s (spectral index) 0.965, of the average of the Omega mesons Regge slope 0.9874428571 and of the dilaton 0.989117352243, are also connected to the following two Rogers-Ramanujan continued fractions:

$$\frac{e^{-\frac{\pi}{5}}}{\sqrt{(\varphi-1)\sqrt{5}}-\varphi+1} = 1-\cfrac{e^{-\pi}}{1+\cfrac{e^{-2\pi}}{1+\cfrac{e^{-3\pi}}{1+\cfrac{e^{-4\pi}}{1+\ldots}}}} \approx 0.9568666373$$

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\dfrac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1} = 1-\cfrac{e^{-\pi\sqrt{5}}}{1+\cfrac{e^{-2\pi\sqrt{5}}}{1+\cfrac{e^{-3\pi\sqrt{5}}}{1+\cfrac{e^{-4\pi\sqrt{5}}}{1+\ldots}}}} \approx 0.9991104684$$

(http://www.bitman.name/math/article/102/109/)

The mean between the two results of the above Rogers-Ramanujan continued fractions is 0.97798855285, value very near to the ψ Regge slope 0.979:

Ψ	3	$m_c = 1500$	0.979	-0.09

Also performing the 512th root of the inverse value of the Pion meson rest mass 139.57, we obtain:

((1/(139.57)))^1/512

Input interpretation:

$$\sqrt[512]{\frac{1}{139.57}}$$

Result:

0.990400732708644027550973755713301415460732796178555551684...

0.99040073.... result very near to the dilaton value $\mathbf{0.989117352243 = \phi}$ and to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1}=1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\dots}}}}\approx 0.9991104684$$

From

AdS Vacua from Dilaton Tadpoles and Form Fluxes - *J. Mourad and A. Sagnotti* - arXiv:1612.08566v2 [hep-th] 22 Feb 2017 - March 27, 2018

We have:

$$e^{2C} = \frac{2\,\xi\,e^{\frac{\phi}{2}}}{1 \pm \sqrt{1 - \frac{\xi T}{3}\,e^{2\phi}}}$$

$$\frac{h^2}{32} = \frac{\xi^7\,e^{4\phi}}{\left(1 \pm \sqrt{1 - \frac{\xi T}{3}\,e^{2\phi}}\right)^7}\left[\frac{42}{\xi}\left(1 \pm \sqrt{1 - \frac{\xi\,T}{3}\,e^{2\phi}}\right) + 5\,T\,e^{2\phi}\right]. \qquad (2.7)$$

For

$T = \frac{16}{\pi^2}$

ξ = 1

we obtain:

(2*e^(0.989117352243/2)) / (1+sqrt(((1-1/3*16/(Pi)^2*e^(2*0.989117352243)))))

Input interpretation:

$$\frac{2\,e^{0.989117352243/2}}{1+\sqrt{1-\frac{1}{3}\times\frac{16}{\pi^2}\,e^{2\times 0.989117352243}}}$$

Result:

0.83941881822… −
1.4311851867… i

Polar coordinates:

$r = 1.65919106525$ (radius), $\theta = -59.607521917°$ (angle)

1.65919106525….. result very near to the 14th root of the following Ramanujan's class invariant $Q = \left(G_{505}/G_{101/5}\right)^3 = 1164.2696$ i.e. 1.65578...

Series representations:

$$\frac{2\,e^{0.98911735224300000/2}}{1+\sqrt{1-\frac{16\,e^{2\times 0.98911735224300000}}{3\,\pi^2}}} = \frac{2\,e^{0.49455867612150000}}{1+\sqrt{-\frac{16\,e^{1.97823470448600000}}{3\,\pi^2}}\,\sum_{k=0}^{\infty}\left(\frac{3}{16}\right)^k\left(-\frac{e^{1.97823470448600000}}{\pi^2}\right)^{-k}\binom{\frac{1}{2}}{k}}$$

$$\frac{2\,e^{0.98911735224300000/2}}{1+\sqrt{1-\frac{16\,e^{2\times 0.98911735224300000}}{3\,\pi^2}}} = \frac{2\,e^{0.49455867612150000}}{1+\sqrt{-\frac{16\,e^{1.97823470448600000}}{3\,\pi^2}}\,\sum_{k=0}^{\infty}\frac{\left(-\frac{3}{16}\right)^k\left(-\frac{e^{1.97823470448600000}}{\pi^2}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}}$$

$$\frac{2\,e^{0.98911735224300000/2}}{1+\sqrt{1-\frac{16\,e^{2\times 0.98911735224300000}}{3\,\pi^2}}} = \frac{2\,e^{0.49455867612150000}}{1+\sqrt{z_0}\,\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1-\frac{16\,e^{1.97823470448600000}}{3\,\pi^2}-z_0\right)^k z_0^{-k}}{k!}}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

From

$$\frac{h^2}{32} = \frac{\xi^7\,e^{4\phi}}{\left(1 \pm \sqrt{1-\frac{\xi T}{3}\,e^{2\phi}}\right)^7}\left[\frac{42}{\xi}\left(1 \pm \sqrt{1-\frac{\xi T}{3}\,e^{2\phi}}\right) + 5\,T\,e^{2\phi}\right]$$

we obtain:

e^(4*0.989117352243) / (((1+sqrt(1-1/3*16/(Pi)^2*e^(2*0.989117352243)))))^7 [42(1+sqrt(1-1/3*16/(Pi)^2*e^(2*0.989117352243)))+5*16/(Pi)^2*e^(2*0.989117352243)]

Input interpretation:

$$\frac{e^{4\times 0.989117352243}}{\left(1+\sqrt{1-\frac{1}{3}\times\frac{16}{\pi^2}\,e^{2\times 0.989117352243}}\right)^7}$$

$$\left(42\left(1+\sqrt{1-\frac{1}{3}\times\frac{16}{\pi^2}\,e^{2\times 0.989117352243}}\right)+5\times\frac{16}{\pi^2}\,e^{2\times 0.989117352243}\right)$$

Result:

50.84107889… –
20.34506335… i

Polar coordinates:

$r = 54.76072411$ (radius), $\theta = -21.80979492°$ (angle)

54.76072411…..

Series representations:

$$\left(\left(42\left(1+\sqrt{1-\frac{16\,e^{2\times 0.98911735224300000}}{3\,\pi^2}}\right)+\frac{5\times 16\,e^{2\times 0.98911735224300000}}{\pi^2}\right)e^{4\times 0.98911735224300000}\right)\Big/\left(1+\sqrt{1-\frac{16\,e^{2\times 0.98911735224300000}}{3\,\pi^2}}\right)^7 =$$

$$\left(2\left(40\,e^{5.934704113458000}+21\,e^{3.956469408972000}\,\pi^2+21\,e^{3.956469408972000}\,\pi^2\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\sum_{k=0}^{\infty}\left(\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\binom{\frac{1}{2}}{k}\right)\right)\Big/\left(\pi^2\left(1+\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\sum_{k=0}^{\infty}\left(\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\binom{\frac{1}{2}}{k}\right)^7\right)$$

$$\left(\left(42\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)+\frac{5\times 16\,e^{2\times 0.9891173522430000}}{\pi^2}\right)e^{4\times 0.9891173522430000}\right)\Big/\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)^7 =$$

$$\left(2\left(40\,e^{5.934704113458000}+21\,e^{3.956469408972000}\,\pi^2+21\,e^{3.956469408972000}\,\pi^2\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\sum_{k=0}^{\infty}\frac{\left(-\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\Big/$$

$$\left(\pi^2\left(1+\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\sum_{k=0}^{\infty}\frac{\left(-\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^7\right)$$

$$\left(\left(42\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)+\frac{5\times 16\,e^{2\times 0.9891173522430000}}{\pi^2}\right)e^{4\times 0.9891173522430000}\right)\Big/\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)^7 =$$

$$\left(2\left(40\,e^{5.934704113458000}+21\,e^{3.956469408972000}\,\pi^2+21\,e^{3.956469408972000}\,\pi^2\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}-z_0\right)^k z_0^{-k}}{k!}\right)\right)\Big/$$

$$\left(\pi^2\left(1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}-z_0\right)^k z_0^{-k}}{k!}\right)^7\right)$$

for (not $(z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0)$)

From which:

e^(4*0.989117352243) / (((1+sqrt(1-1/3*16/(Pi)^2*e^(2*0.989117352243)))))^7 [42(1+sqrt(1-1/3*16/(Pi)^2*e^(2*0.989117352243)))+5*16/(Pi)^2*e^(2*0.989117352243)]*1/34

Input interpretation:

$$\frac{e^{4\times 0.989117352243}}{\left(1+\sqrt{1-\frac{1}{3}\times\frac{16}{\pi^2}\,e^{2\times 0.989117352243}}\right)^7}\left(42\left(1+\sqrt{1-\frac{1}{3}\times\frac{16}{\pi^2}\,e^{2\times 0.989117352243}}\right)+5\times\frac{16}{\pi^2}\,e^{2\times 0.989117352243}\right)\times\frac{1}{34}$$

Result:

$1.495325850\ldots -$
$0.5983842161\ldots\, i$

Polar coordinates:

$r = 1.610609533$ (radius), $\theta = -21.80979492°$ (angle)

1.610609533…. result that is a good approximation to the value of the golden ratio 1.618033988749...

Series representations:

$$\left(\left(42\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)+\frac{5\times 16\,e^{2\times 0.9891173522430000}}{\pi^2}\right)e^{4\times 0.9891173522430000}\right)\Bigg/\left(34\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)^7\right)=$$

$$\left(40\,e^{5.934704113458000}+21\,e^{3.956469408972000}\,\pi^2+21\,e^{3.956469408972000}\,\pi^2\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\sum_{k=0}^{\infty}\left(\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\binom{\frac{1}{2}}{k}\right)\Bigg/\left(17\,\pi^2\left(1+\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\sum_{k=0}^{\infty}\left(\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\binom{\frac{1}{2}}{k}\right)^7\right)$$

$$\left(\left(42\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)+\frac{5\times 16\,e^{2\times 0.9891173522430000}}{\pi^2}\right) e^{4\times 0.9891173522430000}\right)\Big/\left(34\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)^7\right)=$$

$$\left(40\,e^{5.934704113458000}+21\,e^{3.956469408972000}\,\pi^2+21\,e^{3.956469408972000}\,\pi^2\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\sum_{k=0}^{\infty}\frac{\left(-\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\Big/$$

$$\left(17\,\pi^2\left(1+\sqrt{-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}}\sum_{k=0}^{\infty}\frac{\left(-\frac{3}{16}\right)^k\left(-\frac{e^{1.978234704486000}}{\pi^2}\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^7\right)$$

$$\left(\left(42\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)+\frac{5\times 16\,e^{2\times 0.9891173522430000}}{\pi^2}\right) e^{4\times 0.9891173522430000}\right)\Big/\left(34\left(1+\sqrt{1-\frac{16\,e^{2\times 0.9891173522430000}}{3\,\pi^2}}\right)^7\right)=$$

$$\left(40\,e^{5.934704113458000}+21\,e^{3.956469408972000}\,\pi^2+21\,e^{3.956469408972000}\,\pi^2\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}-z_0\right)^k z_0^{-k}}{k!}\right)\Big/$$

$$\left(17\,\pi^2\left(1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1-\frac{16\,e^{1.978234704486000}}{3\,\pi^2}-z_0\right)^k z_0^{-k}}{k!}\right)^7\right)$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

Now, we have:

$$e^{2C} = \frac{2\,\xi\, e^{-\frac{\phi}{2}}}{1 + \sqrt{1 + \frac{\xi\Lambda}{3}\, e^{2\phi}}}\,, \tag{2.9}$$

$$\frac{h^2}{32} = \frac{e^{-4\phi}}{\left[1 + \sqrt{1 + \frac{\Lambda}{3}\, e^{2\phi}}\right]^7} \left[42\left(1 + \sqrt{1 + \frac{\Lambda}{3}\, e^{2\phi}}\right) - 13\,\Lambda\, e^{2\phi}\right]. \tag{2.10}$$

For:

$\xi = 1$

$\Lambda \simeq \frac{4\pi^2}{25}$

$\phi = 0.989117352243$

From

$$e^{2C} = \frac{2\,\xi\, e^{-\frac{\phi}{2}}}{1 + \sqrt{1 + \frac{\xi\Lambda}{3}\, e^{2\phi}}}\,,$$

we obtain:

((2*e^(-0.989117352243/2))) / ((((1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243)))))))

Input interpretation:

$$\frac{2\, e^{-0.989117352243/2}}{1 + \sqrt{1 + \frac{1}{3}\left(\frac{1}{25}\left(4\,\pi^2\right)\right) e^{2\times 0.989117352243}}}$$

Result:

0.382082347529...

0.382082347529….

Series representations:

$$\frac{2\,e^{-0.98911735224300000/2}}{1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.98911735224300000}}{3\times 25}}} = 2\Bigg/\left(e^{0.49455867612150000}\left(1+\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)\right)$$

$$\frac{2\,e^{-0.98911735224300000/2}}{1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.98911735224300000}}{3\times 25}}} = 2\Bigg/\left(e^{0.49455867612150000}\left(1+\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right)$$

$$\frac{2\,e^{-0.98911735224300000/2}}{1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.98911735224300000}}{3\times 25}}} = \frac{2}{e^{0.49455867612150000}\left(1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)}$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

From which:

1+1/(((4((2*e^(-0.989117352243/2))) / ((((1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))))))))

Input interpretation:

$$1+\frac{1}{4\times\frac{2\,e^{-0.989117352243/2}}{1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\,\pi^2\right)\right)e^{2\times0.989117352243}}}}$$

Result:

1.65430921270...

1.6543092….. We note that, the result 1.6543092... is very near to the 14th root of the following Ramanujan's class invariant $Q=\left(G_{505}/G_{101/5}\right)^3=1164.2696$ i.e. 1.65578...

Indeed:

$$G_{505}=P^{-1/4}Q^{1/6}=(\sqrt{5}+2)^{1/2}\left(\frac{\sqrt{5}+1}{2}\right)^{1/4}(\sqrt{101}+10)^{1/4}$$
$$\times\left((130\sqrt{5}+29\sqrt{101})+\sqrt{169440+7540\sqrt{505}}\right)^{1/6}.$$

Thus, it remains to show that

$$(130\sqrt{5}+29\sqrt{101})+\sqrt{169440+7540\sqrt{505}}=\left(\sqrt{\frac{113+5\sqrt{505}}{8}}+\sqrt{\frac{105+5\sqrt{505}}{8}}\right)^3,$$

which is straightforward. □

$$\sqrt[14]{\left(\sqrt{\frac{113+5\sqrt{505}}{8}}+\sqrt{\frac{105+5\sqrt{505}}{8}}\right)^3}=1{,}65578\ldots$$

Series representations:

$$1+\frac{1}{\frac{4\left(2\,e^{-0.98911735224430000/2}\right)}{1+\sqrt{1+\frac{(4\,\pi^2)\,e^{2\times 0.98911735224430000}}{3\times 25}}}}=$$

$$1+\frac{e^{0.4945586761215000}}{8}+\frac{1}{8}\,e^{0.4945586761215000}\,\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\,\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}$$

$$1+\frac{1}{\frac{4\left(2\,e^{-0.98911735224430000/2}\right)}{1+\sqrt{1+\frac{(4\,\pi^2)\,e^{2\times 0.98911735224430000}}{3\times 25}}}}=$$

$$1+\frac{e^{0.4945586761215000}}{8}+\frac{1}{8}\,e^{0.4945586761215000}\,\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\,\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

$$1+\frac{1}{\frac{4\left(2\,e^{-0.98911735224430000/2}\right)}{1+\sqrt{1+\frac{(4\,\pi^2)\,e^{2\times 0.98911735224430000}}{3\times 25}}}}=1+\frac{e^{0.4945586761215000}}{8}+$$

$$\frac{1}{8}\,e^{0.4945586761215000}\,\sqrt{z_0}\,\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}$$

for (not ($z_0\in\mathbb{R}$ and $-\infty<z_0\leq 0$))

And from

$$\frac{h^2}{32} = \frac{e^{-4\phi}}{\left[1 + \sqrt{1 + \frac{\Lambda}{3} e^{2\phi}}\right]^7} \left[42 \left(1 + \sqrt{1 + \frac{\Lambda}{3} e^{2\phi}}\right) - 13 \Lambda e^{2\phi}\right] .$$

we obtain:

e^(-4*0.989117352243) / [1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243)))]^7 * [42(1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243)))-13*(4Pi^2)/25*e^(2*0.989117352243)]

Input interpretation:

$$\frac{e^{-4\times 0.989117352243}}{\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}}\right)^7} \left(42\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}} - 13\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}\right)\right)$$

Result:

−0.034547055658...

-0.034547055658…

Series representations:

$$\left(\left(42\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}(4\pi^2)\,13\,e^{2\times 0.9891173522430000}\right)\right)e^{-4\times 0.9891173522430000}\right)\Bigg/\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7=$$

$$-\left(\left(42\left(-25\,e^{1.978234704486000}+52\,e^{3.956469408972000}\,\pi^2-25\,e^{1.978234704486000}\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)\right)\Bigg/\left(25\,e^{5.934704113458000}\left(1+\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)^7\right)\right)$$

$$\left(\left(42\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}(4\pi^2)\,13\,e^{2\times 0.9891173522430000}\right)\right)e^{-4\times 0.9891173522430000}\right)\Bigg/\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7=$$

$$-\left(\left(42\left(-25\,e^{1.978234704486000}+52\,e^{3.956469408972000}\,\pi^2-25\,e^{1.978234704486000}\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\right)\Bigg/\left(25\,e^{5.934704113458000}\left(1+\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^7\right)\right)$$

$$\left(\left(42\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}(4\pi^2)\,13\,e^{2\times 0.9891173522430000}\right)\right)e^{-4\times 0.9891173522430000}\right)\Big/\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7 = -\left(\left(42\left(-25\,e^{1.978234704486000}+52\,e^{3.956469408972000}\,\pi^2-25\,e^{1.978234704486000}\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)\right)\Big/\left(25\,e^{5.934704113458000}\left(1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)^7\right)\right)$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

From which:

47 *1/(((-1/(((((e^(-4*0.989117352243) / [1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))]^7 * [42(1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))-13*(4Pi^2)/25*e^(2*0.989117352243))]))))))))

Input interpretation:

$$47\left(-\left(1\Big/1\Big/\left(\frac{e^{-4\times 0.989117352243}}{\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}(4\pi^2)\right)e^{2\times 0.989117352243}}\right)^7}\left(42\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}(4\pi^2)\right)e^{2\times 0.989117352243}}-13\left(\frac{1}{25}(4\pi^2)\right)e^{2\times 0.989117352243}\right)\right)\right)\right)\right)$$

Result:

1.6237116159...

1.6237116159…. result that is an approximation to the value of the golden ratio 1.618033988749...

Series representations:

$$-\left(47/1/\left(e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\pi^2)e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}(4\pi^2)\,13\,e^{2\times 0.9891173522430000}\right)\right)\right)\Big/\left(1+\sqrt{1+\frac{(4\pi^2)e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)=$$

$$\left(1974\left(-25\,e^{1.978234704486000}+52\,e^{3.956469408972000}\,\pi^2-25\,e^{1.978234704486000}\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)\right)\Big/\left(25\,e^{5.934704113458000}\left(1+\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)^7\right)$$

$$-\Bigg(47\Big/1\Big/\Bigg(e^{-4\times 0.9891173522430000}\Bigg(42\Bigg(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}(4\pi^2)\,13\,e^{2\times 0.9891173522430000}\Bigg)\Bigg)\Bigg)\Bigg)\Big/\Bigg(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\Bigg)^7\Bigg)=$$

$$\Bigg(1974\Bigg(-25\,e^{1.978234704486000}+52\,e^{3.956469408972000}\,\pi^2-25\,e^{1.978234704486000}\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\Bigg)\Bigg)\Big/\Bigg(25\,e^{5.934704113458000}\Bigg(1+\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\Bigg)^7\Bigg)$$

$$-\Bigg(47\Big/1\Big/\Bigg(e^{-4\times 0.9891173522430000}\Bigg(42\Bigg(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}(4\pi^2)\,13\,e^{2\times 0.9891173522430000}\Bigg)\Bigg)\Bigg)\Bigg)\Big/\Bigg(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\Bigg)^7\Bigg)=$$

$$\Bigg(1974\Bigg(-25\,e^{1.978234704486000}+52\,e^{3.956469408972000}\,\pi^2-25\,e^{1.978234704486000}\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\Bigg)\Bigg)\Big/\Bigg(25\,e^{5.934704113458000}\Bigg(1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\Bigg)^7\Bigg)$$

for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

And again:

32((((e^(-4*0.989117352243) / [1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))]^7 * [42(1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))-13*(4Pi^2)/25*e^(2*0.989117352243))]))))

Input interpretation:

$$32\left(\frac{e^{-4\times 0.989117352243}}{\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}}\right)^7}\left(42\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}}-13\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}\right)\right)\right)$$

Result:

$-1.1055057810\ldots$

-1.1055057810….

We note that the result -1.1055057810…. is very near to the value of Cosmological Constant, less 10^{-52} , thence 1.1056, with minus sign

Series representations:

$$\left(32\, e^{-4\times 0.9891173522430000} \left(42 \left(1+\sqrt{1+\frac{(4\,\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}} - \frac{1}{25}\,(4\,\pi^2)\, 13\, e^{2\times 0.9891173522430000}\right)\right)\right) \Big/ \left(1+\sqrt{1+\frac{(4\,\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7 =$$

$$-\left(\left(1344 \left(-25\, e^{1.978234704486000} + 52\, e^{3.956469408972000}\, \pi^2 - 25\, e^{1.978234704486000} \sqrt{\frac{4\, e^{1.978234704486000}\, \pi^2}{75}} \sum_{k=0}^{\infty} \left(\frac{75}{4}\right)^k \left(e^{1.978234704486000}\, \pi^2\right)^{-k} \binom{\frac{1}{2}}{k}\right)\right) \Big/ \left(25\, e^{5.934704113458000} \left(1+\sqrt{\frac{4\, e^{1.978234704486000}\, \pi^2}{75}} \sum_{k=0}^{\infty} \left(\frac{75}{4}\right)^k \left(e^{1.978234704486000}\, \pi^2\right)^{-k} \binom{\frac{1}{2}}{k}\right)^7\right)\right)$$

$$\left(32\,e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\,\pi^{2})\,e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}\,(4\,\pi^{2})\,13\,e^{2\times 0.9891173522430000}\right)\right)\right)\Big/\left(1+\sqrt{1+\frac{(4\,\pi^{2})\,e^{2\times 0.9891173522430000}}{3\times 25}}\right)^{7}=-\left(\left(1344\left(-25\,e^{1.978234704486000}+52\,e^{3.956469408972000}\,\pi^{2}-25\,e^{1.978234704486000}\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^{2}}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^{k}\left(e^{1.978234704486000}\,\pi^{2}\right)^{-k}\left(-\frac{1}{2}\right)_{k}}{k!}\right)\right)\Big/\left(25\,e^{5.934704113458000}\left(1+\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^{2}}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^{k}\left(e^{1.978234704486000}\,\pi^{2}\right)^{-k}\left(-\frac{1}{2}\right)_{k}}{k!}\right)^{7}\right)\right)$$

$$\left(32\,e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\,\pi^{2})\,e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}\,(4\,\pi^{2})\,13\,e^{2\times 0.9891173522430000}\right)\right)\right)\Big/\left(1+\sqrt{1+\frac{(4\,\pi^{2})\,e^{2\times 0.9891173522430000}}{3\times 25}}\right)^{7}=-\left(\left(1344\left(-25\,e^{1.978234704486000}+52\,e^{3.956469408972000}\,\pi^{2}-25\,e^{1.978234704486000}\sqrt{z_{0}}\sum_{k=0}^{\infty}\frac{(-1)^{k}\left(-\frac{1}{2}\right)_{k}\left(1+\frac{4\,e^{1.978234704486000}\,\pi^{2}}{75}-z_{0}\right)^{k}z_{0}^{-k}}{k!}\right)\right)\Big/\left(25\,e^{5.934704113458000}\left(1+\sqrt{z_{0}}\sum_{k=0}^{\infty}\frac{(-1)^{k}\left(-\frac{1}{2}\right)_{k}\left(1+\frac{4\,e^{1.978234704486000}\,\pi^{2}}{75}-z_{0}\right)^{k}z_{0}^{-k}}{k!}\right)^{7}\right)\right)$$

for (not $(z_{0}\in\mathbb{R}$ and $-\infty<z_{0}\leq 0))$

And:

-[32((((e^(-4*0.989117352243) / [1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))]^7 * [42(1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))-13*(4Pi^2)/25*e^(2*0.989117352243))])))))]^5

Input interpretation:

$$-\left(32\left(\frac{e^{-4\times 0.989117352243}}{\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}}\right)^7}\left(42\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}}-13\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}\right)\right)\right)\right)^5$$

Result:

1.651220569...

1.651220569…. result very near to the 14th root of the following Ramanujan’s class invariant $Q = \left(G_{505}/G_{101/5}\right)^3 = 1164.2696$ i.e. 1.65578...

Series representations:

$$-\left(\left(\left(32\, e^{-4\times 0.98911735224300000}\left(42\left(1+\sqrt{1+\frac{(4\pi^2)\, e^{2\times 0.98911735224300000}}{3\times 25}}-\frac{1}{25}(4\pi^2)\, 13\, e^{2\times 0.98911735224300000}\right)\right)\right)\right)\Big/\left(1+\sqrt{1+\frac{(4\pi^2)\, e^{2\times 0.98911735224300000}}{3\times 25}}\right)^7\right)^5 =$$

$$\left(4\,385\,270\,057\,140\,224\left(-25+52\, e^{1.978234704486000}\,\pi^2-25\sqrt{\frac{4\, e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)^5\right)\Big/\left(9\,765\,625\, e^{19.78234704486000}\left(1+\sqrt{\frac{4\, e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)^{35}\right)$$

$$-\left(\left(\left(32\, e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}(4\pi^2)\, 13\, e^{2\times 0.9891173522430000}\right)\right)\right)\right)\Big/\left(1+\sqrt{1+\frac{(4\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)^5 =$$

$$\left(4\,385\,270\,057\,140\,224\left(-25+52\, e^{1.978234704486000}\,\pi^2-25\sqrt{\frac{4\, e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^5\right)\Big/\left(9\,765\,625\, e^{19.78234704486000}\left(1+\sqrt{\frac{4\, e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^{35}\right)$$

$$-\left(\left(\left(32\, e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}(4\pi^2)\, 13\, e^{2\times 0.9891173522430000}\right)\right)\right)\right)\Big/\left(1+\sqrt{1+\frac{(4\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)^5 =$$

$$\left(4\,385\,270\,057\,140\,224\left(-25+52\, e^{1.978234704486000}\,\pi^2-25\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\, e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)^5\right)\Big/\left(9\,765\,625\, e^{19.78234704486000}\left(1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\, e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)^{35}\right)$$

for (not $(z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0)$)

We obtain also:

-[32((((e^(-4*0.989117352243) / [1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))]^7 * [42(1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))-13*(4Pi^2)/25*e^(2*0.989117352243))]))))]^1/2

Input interpretation:

$$-\sqrt{\left(32\left(\frac{e^{-4\times 0.989117352243}}{\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}}\right)^7}\left(42\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}}\right)-13\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}\right)\right)\right)}$$

Result:

-0

$1.0514303501\ldots\, i$

Polar coordinates:

$r = 1.05143035007$ (radius), $\theta = -90°$ (angle)

1.05143035007

Series representations:

$$-\sqrt{\left(\left(32\,e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\,\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\right)-\frac{1}{25}(4\,\pi^2)\,13\,e^{2\times 0.9891173522430000}\right)\right)\Big/\left(1+\sqrt{1+\frac{(4\,\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)}=-\frac{8}{5}\sqrt{21}\,\sqrt{\left(\left(25-52\,e^{1.978234704486000}\,\pi^2+25\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)\Big/\left(e^{3.956469408972000}\left(1+\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)^7\right)\right)}$$

$$-\sqrt{\left(\left(32\,e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}(4\pi^2)\,13\,e^{2\times 0.9891173522430000}\right)\right)\right)\Big/\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)}=-\frac{8}{5}\sqrt{21}\,\sqrt{\left(\left(25-52\,e^{1.978234704486000}\,\pi^2+25\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\Big/\left(e^{3.956469408972000}\left(1+\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^7\right)\right)}$$

$$-\sqrt{\left(\left(32\,e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}(4\pi^2)\,13\,e^{2\times 0.9891173522430000}\right)\right)\right)\Big/\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)}=$$

$$-\frac{8}{5}\sqrt{21}\,\sqrt{\left(\left(25-52\,e^{1.978234704486000}\,\pi^2+25\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)\Big/\left(e^{3.956469408972000}\left(1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)^7\right)\right)}$$

for (not ($z_0\in\mathbb{R}$ and $-\infty<z_0\leq 0$))

1 / -[32((((e^(-4*0.989117352243) / [1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))]^7 * [42(1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))-13*(4Pi^2)/25*e^(2*0.989117352243))])))))]^1/2

Input interpretation:

$$-\left(1\middle/\sqrt{\left(32\left(\frac{e^{-4\times 0.989117352243}}{\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}}\right)^7}\left(42\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}}-13\left(\frac{1}{25}\left(4\pi^2\right)\right)e^{2\times 0.989117352243}\right)\right)\right)\right)}\right)$$

Result:

$0.95108534763\ldots\, i$

Polar coordinates:

$r = 0.95108534763$ (radius), $\theta = 90°$ (angle)

0.95108534763

We know that the primordial fluctuations are consistent with Gaussian purely adiabatic scalar perturbations characterized by a power spectrum with a spectral index $n_s = 0.965 \pm 0.004$, consistent with the predictions of slow-roll, single-field, inflation.

Thence 0.95108534763 is a result very near to the spectral index n_s, to the mesonic Regge slope, to the inflaton value at the end of the inflation 0.9402 and to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{5}}}{\sqrt{(\varphi-1)\sqrt{5}-\varphi+1}}=1-\cfrac{e^{-\pi}}{1+\cfrac{e^{-2\pi}}{1+\cfrac{e^{-3\pi}}{1+\cfrac{e^{-4\pi}}{1+\ldots}}}}\approx 0.9568666373$$

Series representations:

$$-\left(1\Big/\left(\sqrt{\left(\left(32\, e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\,\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}\right)-\frac{1}{25}(4\,\pi^2)\,13\, e^{2\times 0.9891173522430000}\right)\right)\Big/\left(1+\sqrt{1+\frac{(4\,\pi^2)\, e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)}\right)\right)=$$

$$-\left(5\Big/\left(8\sqrt{21}\sqrt{\left(\left(25-52\, e^{1.978234704486000}\,\pi^2+25\sqrt{\frac{4\, e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)\Big/\left(e^{3.956469408972000}\left(1+\sqrt{\frac{4\, e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}\right)^7\right)\right)}\right)\right)$$

$$-\left(1\Big/\left(\sqrt{\left(\left(32\,e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}(4\pi^2)\,13\,e^{2\times 0.9891173522430000}\right)\right)\right)\Big/\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)}\right)\right)=$$

$$-\left(5\Big/\left(8\sqrt{21}\sqrt{\left(\left(\left(25-52\,e^{1.978234704486000}\,\pi^2+25\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)\Big/\left(e^{3.956469408972000}\left(1+\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}\right)^7\right)\right)\right)}\right)\right)$$

$$-\left(1\middle/\left(\sqrt{\left(\left(32\,e^{-4\times 0.9891173522430000}\left(42\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}-\frac{1}{25}(4\pi^2)\,13\,e^{2\times 0.9891173522430000}\right)\right)\right)\middle/\left(1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.9891173522430000}}{3\times 25}}\right)^7\right)}\right)\right)=$$

$$-\left(5\middle/\left(8\sqrt{21}\sqrt{\left(\left(25-52\,e^{1.978234704486000}\,\pi^2+25\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)\middle/\left(e^{3.956469408972000}\left(1+\sqrt{z_0}\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}\right)^7\right)\right)}\right)\right)$$

for $(\text{not }(z_0 \in \mathbb{R} \text{ and } -\infty < z_0 \le 0))$

From the previous expression

$$\frac{e^{-4\times 0.989117352243}}{\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}(4\pi^2)\right)e^{2\times 0.989117352243}}\right)^7}\left(42\left(1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}(4\pi^2)\right)e^{2\times 0.989117352243}}-13\left(\frac{1}{25}(4\pi^2)\right)e^{2\times 0.989117352243}\right)\right)$$

= -0.034547055658…

we have also:

1+1/(((4((2*e^(-0.989117352243/2))) / ((((1+sqrt(((1+1/3*(4Pi^2)/25*e^(2*0.989117352243))))))))))) + (-0.034547055658)

Input interpretation:

$$1+\frac{1}{4\times\frac{2\,e^{-0.989117352243/2}}{1+\sqrt{1+\frac{1}{3}\left(\frac{1}{25}\left(4\,\pi^2\right)\right)e^{2\times 0.989117352243}}}}-0.034547055658$$

Result:

1.61976215705...

1.61976215705….. result that is a very good approximation to the value of the golden ratio 1.618033988749...

Series representations:

$$1+\frac{1}{\frac{4\left(2\,e^{-0.98911735224300000/2}\right)}{1+\sqrt{1+\frac{\left(4\,\pi^2\right)e^{2\times 0.98911735224300000}}{3\times 25}}}}-0.0345470556580000=$$

$$0.9654529443420000+\frac{e^{0.494558676121500}}{8}+\frac{1}{8}\,e^{0.494558676121500}$$
$$\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\left(\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\binom{\frac{1}{2}}{k}$$

$$1+\frac{1}{\frac{4\left(2\,e^{-0.98911735224300000/2}\right)}{1+\sqrt{1+\frac{\left(4\,\pi^2\right)e^{2\times 0.98911735224300000}}{3\times 25}}}}-0.0345470556580000=$$

$$0.9654529443420000+\frac{e^{0.494558676121500}}{8}+\frac{1}{8}\,e^{0.494558676121500}$$
$$\sqrt{\frac{4\,e^{1.978234704486000}\,\pi^2}{75}}\sum_{k=0}^{\infty}\frac{\left(-\frac{75}{4}\right)^k\left(e^{1.978234704486000}\,\pi^2\right)^{-k}\left(-\frac{1}{2}\right)_k}{k!}$$

$$1+\frac{1}{\frac{4\left(2\,e^{-0.98911735224300000/2}\right)}{1+\sqrt{1+\frac{(4\pi^2)\,e^{2\times 0.98911735224300000}}{3\times 25}}}}-0.0345470556580000=$$

$$0.9654529443420000+\frac{e^{0.4945586761215000}}{8}+$$

$$\frac{1}{8}\,e^{0.4945586761215000}\,\sqrt{z_0}\,\sum_{k=0}^{\infty}\frac{(-1)^k\left(-\frac{1}{2}\right)_k\left(1+\frac{4\,e^{1.978234704486000}\,\pi^2}{75}-z_0\right)^k z_0^{-k}}{k!}$$

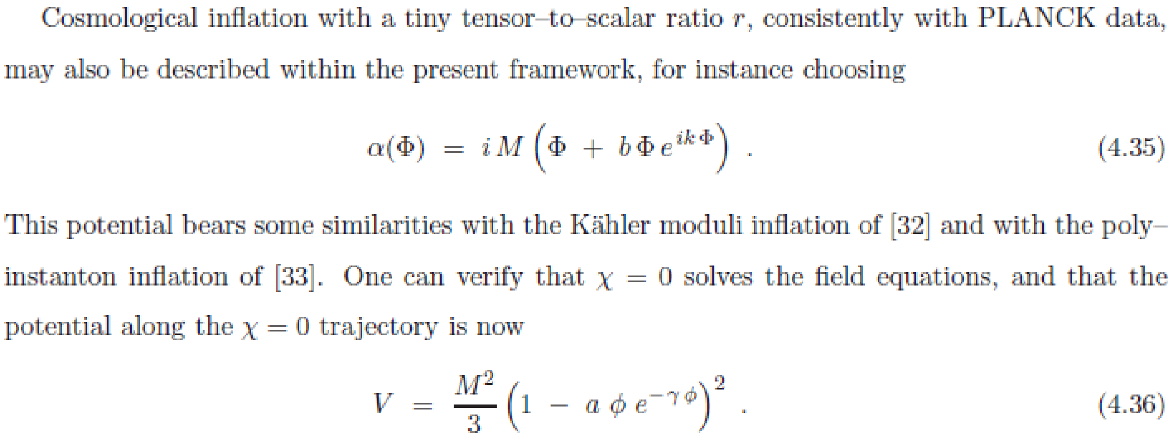
for (not ($z_0 \in \mathbb{R}$ and $-\infty < z_0 \leq 0$))

From

Properties of Nilpotent Supergravity

E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti - arXiv:1507.07842v2 [hep-th] 14 Sep 2015

We have that:



Cosmological inflation with a tiny tensor–to–scalar ratio r, consistently with PLANCK data, may also be described within the present framework, for instance choosing

$$\alpha(\Phi) \;=\; i\,M\left(\Phi \;+\; b\,\Phi\,e^{\,i k\,\Phi}\right) \;. \tag{4.35}$$

This potential bears some similarities with the Kähler moduli inflation of [32] and with the poly–instanton inflation of [33]. One can verify that $\chi = 0$ solves the field equations, and that the potential along the $\chi = 0$ trajectory is now

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2 \;. \tag{4.36}$$

We analyzing the following equation:

$$V \;=\; \frac{M^2}{3}\left(1 \;-\; a\,\phi\,e^{-\gamma\,\phi}\right)^2 \;.$$

$$\phi \;=\; \varphi \;-\; \frac{\sqrt{6}}{k}\;,$$

$$a = \frac{b\gamma}{e} < 0 , \qquad \gamma = \frac{k}{\sqrt{6}} < 0 .$$

We have:

(M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

i.e.

V = (M^2)/3*[1-(b/euler number * k/sqrt6) * (φ- sqrt6/k) * exp(-(k/sqrt6)(φ- sqrt6/k))]^2

For k = 2 and φ = 0.9991104684, that is the value of the scalar field that is equal to the value of the following Rogers-Ramanujan continued fraction:

$$\frac{e^{-\frac{\pi}{\sqrt{5}}}}{\frac{\sqrt{5}}{1+\sqrt[5]{\sqrt{\varphi^5\sqrt[4]{5^3}}-1}}-\varphi+1} = 1-\frac{e^{-\pi\sqrt{5}}}{1+\frac{e^{-2\pi\sqrt{5}}}{1+\frac{e^{-3\pi\sqrt{5}}}{1+\frac{e^{-4\pi\sqrt{5}}}{1+\dots}}}} \approx 0.9991104684$$

we obtain:

V = (M^2)/3*[1-(b/euler number * 2/sqrt6) * (0.9991104684- sqrt6/2) * exp(-(2/sqrt6)(0.9991104684- sqrt6/2))]^2

Input interpretation:

$$V = \frac{M^2}{3}\left(1-\left(\frac{b}{e}\times\frac{2}{\sqrt{6}}\right)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2}{\sqrt{6}}\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\right)\right)^2$$

Result:

$$V = \frac{1}{3}(0.0814845\,b+1)^2 M^2$$

Solutions:

$$b = \frac{225.913\left(-0.054323\, M^2 \pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2} \quad (M \neq 0)$$

Alternate forms:

$$V = 0.00221324\,(b + 12.2723)^2\, M^2$$

$$V = 0.00221324\left(b^2 M^2 + 24.5445\, b\, M^2 + 150.609\, M^2\right)$$

$$-0.00221324\, b^2 M^2 - 0.054323\, b\, M^2 - \frac{M^2}{3} + V = 0$$

Expanded form:

$$V = 0.00221324\, b^2 M^2 + 0.054323\, b\, M^2 + \frac{M^2}{3}$$

Alternate form assuming b, M, and V are positive:

$$V = 0.00221324\,(b + 12.2723)^2\, M^2$$

Alternate form assuming b, M, and V are real:

$$V = 0.00221324\, b^2 M^2 + 0.054323\, b\, M^2 + 0.333333\, M^2 + 0$$

Derivative:

$$\frac{\partial}{\partial b}\left(\frac{1}{3}(0.0814845\, b + 1)^2 M^2\right) = 0.054323\,(0.0814845\, b + 1)\, M^2$$

Implicit derivatives:

$$\frac{\partial b(M, V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}$$

$$\frac{\partial b(M, V)}{\partial M} = -\frac{\frac{226\,802\,245}{18\,480\,874} + b}{M}$$

$$\frac{\partial M(b, V)}{\partial V} = \frac{154\,317\,775\,011\,120\,075}{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}$$

$$\frac{\partial M(b, V)}{\partial b} = -\frac{18\,480\,874\,M}{226\,802\,245 + 18\,480\,874\,b}$$

$$\frac{\partial V(b, M)}{\partial M} = \frac{2\,(226\,802\,245 + 18\,480\,874\,b)^2\,M}{154\,317\,775\,011\,120\,075}$$

$$\frac{\partial V(b, M)}{\partial b} = \frac{36\,961\,748\,(226\,802\,245 + 18\,480\,874\,b)\,M^2}{154\,317\,775\,011\,120\,075}$$

Global minimum:

$$\min\left\{\frac{1}{3}\,(0.0814845\,b + 1)^2\,M^2\right\} = 0 \text{ at } (b, M) = (-16, 0)$$

Global minima:

$$\min\left\{\frac{1}{3}M^2\left(1-\frac{(b\ 2)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684-\frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\sqrt{6}}\right)^2\right\}=0$$

$$\text{for }\ b=-\frac{226802245}{18480874}$$

$$\min\left\{\frac{1}{3}M^2\left(1-\frac{(b\ 2)\left(0.9991104684-\frac{\sqrt{6}}{2}\right)\exp\left(-\frac{2\left(0.9991104684-\frac{\sqrt{6}}{2}\right)}{\sqrt{6}}\right)}{e\sqrt{6}}\right)^2\right\}=0$$

$$\text{for }\ M=0$$

From:

$$b=\frac{225.913\left(-0.054323\,M^2\pm 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}\quad (M\neq 0)$$

we obtain

(225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2

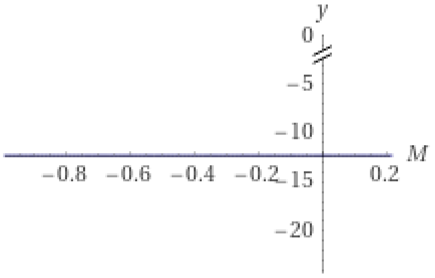
Input interpretation:

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}$$

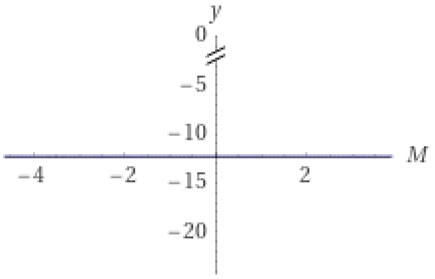
Result:

$$\frac{225.913\left(6.58545\times 10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}$$

Plots:



(M from −1 to 0.2)



(M from −4.6 to 3.9)

Alternate form assuming M is real:

-12.2723

-12.2723 result very near to the black hole entropy value 12.1904 = ln(196884)

Alternate forms:

$$-\frac{12.2723\left(M^2 - 1.21228\times 10^{-8}\sqrt{M^4}\right)}{M^2}$$

$$\frac{1.48774\times 10^{-7}\sqrt{M^4} - 12.2723\, M^2}{M^2}$$

Expanded form:

$$\frac{1.48774\times 10^{-7}\sqrt{M^4}}{M^2}-12.2723$$

Property as a function:

Parity

even

Series expansion at M = 0:

$$\left(\frac{1.48774\times 10^{-7}\sqrt{M^4}}{M^2}-12.2723\right)+O\left(M^6\right)$$

(generalized Puiseux series)

Series expansion at M = ∞:

$$-12.2723$$

Derivative:

$$\frac{d}{dM}\left(\frac{225.913\left(6.58545\times 10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right)=\frac{3.55271\times 10^{-15}}{M}$$

Indefinite integral:

$$\int\frac{225.913\left(-0.054323\,M^2+6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}\,dM=$$

$$\frac{1.48774\times 10^{-7}\sqrt{M^4}}{M}-12.2723\,M+\text{constant}$$

Global maximum:

$$\max\left\{\frac{225.913\left(6.58545\times 10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$

$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{ at }\ M=-1$$

Global minimum:

$$\min\left\{\frac{225.913\left(6.58545\times 10^{-10}\sqrt{M^4}-0.054323\,M^2\right)}{M^2}\right\}=$$

$$-\frac{140\,119\,826\,723\,990\,341\,497\,649}{11\,417\,594\,849\,251\,000\,000\,000}\ \text{ at }\ M=-1$$

Limit:

$$\lim_{M\to\pm\infty}\frac{225.913\left(-0.054323\,M^2+6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}=-12.2723$$

Definite integral after subtraction of diverging parts:

$$\int_0^\infty\left(\frac{225.913\left(-0.054323\,M^2+6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}--12.2723\right)dM=0$$

From b that is equal to

$$\frac{225.913\left(-0.054323\,M^2+6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}$$

from:

Result:

$$V = \frac{1}{3}(0.0814845\, b + 1)^2 M^2$$

we obtain:

1/3 (0.0814845 ((225.913 (-0.054323 M^2 + 6.58545×10^-10 sqrt(M^4)))/M^2) + 1)^2 M^2

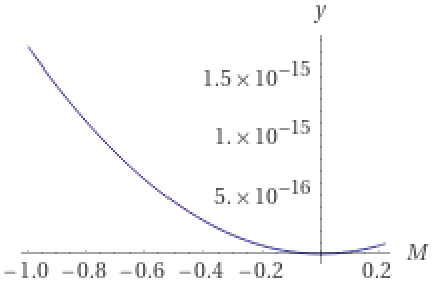
Input interpretation:

$$\frac{1}{3}\left(0.0814845 \times \frac{225.913\left(-0.054323\, M^2 + 6.58545 \times 10^{-10}\sqrt{M^4}\right)}{M^2} + 1\right)^2 M^2$$

Result:

0

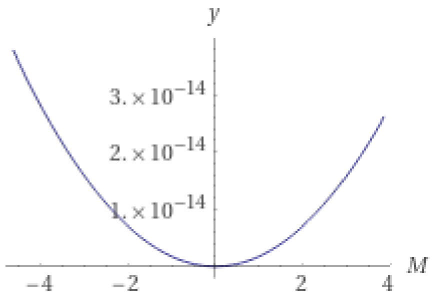
Plots: **(possible mathematical connection with an open string)**



(M from −1 to 0.2)

M = -0.5; M = 0.2

(possible mathematical connection with an open string)



(M from −4.6 to 3.9)

M = 2 ; M = 3

Root:

$M = 0$

Property as a function:

Parity

even

Series expansion at M = 0:

$O(M^{62194})$

(Taylor series)

Series expansion at M = ∞:

$1.75541 \times 10^{-15} M^2 + O\left(\left(\frac{1}{M}\right)^{62194}\right)$

(Taylor series)

Definite integral after subtraction of diverging parts:

$$\int_0^\infty \left(\frac{1}{3} M^2 \left(1 + \frac{18.4084\left(-0.054323\, M^2 + 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}\right)^2 - 1.75541\times 10^{-15}\, M^2\right) dM = 0$$

For M = - 0.5 , we obtain:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\, M^2 + 6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2} + 1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 (-0.5)^2 + 6.58545×10^-10 sqrt((-0.5)^4)))/(-0.5)^2) + 1)^2 * (-0.5^2)

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,(-0.5)^2 + 6.58545\times 10^{-10}\sqrt{(-0.5)^4}\right)}{(-0.5)^2} + 1\right)^2 \left(-0.5^2\right)$$

Result:

$$-4.38851344947464545348970783378088020833333333333333333333\ldots\times 10^{-16}$$

$-4.38851344947*10^{-16}$

For M = 0.2:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 0.2^2 + 6.58545×10^-10 sqrt(0.2^4)))/0.2^2) + 1)^2 0.2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times0.2^2+6.58545\times10^{-10}\sqrt{0.2^4}\right)}{0.2^2}+1\right)^2\times0.2^2$$

Result:

$7.02162151915943272558353253404940833333333333333333333333\ldots\times 10^{-17}$

7.021621519159*10^{-17}

For M = 3:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 3^2 + 6.58545×10^-10 sqrt(3^4)))/3^2) + 1)^2 3^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times 3^2+6.58545\times 10^{-10}\sqrt{3^4}\right)}{3^2}+1\right)^2\times 3^2$$

Result:

$1.5798648418108723632562948201611 16875\times 10^{-14}$

1.57986484181*10^{-14}

For M = 2:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\,M^2+6.58545\times 10^{-10}\sqrt{M^4}\right)}{M^2}+1\right)^2 M^2$$

1/3 (0.0814845 ((225.913 (-0.054323 2^2 + 6.58545×10^-10 sqrt(2^4)))/2^2) + 1)^2 2^2

Input interpretation:

$$\frac{1}{3}\left(0.0814845\times\frac{225.913\left(-0.054323\times 2^2+6.58545\times 10^{-10}\sqrt{2^4}\right)}{2^2}+1\right)^2\times 2^2$$

Result:

$7.0216215191594327255835325340494083333333333333333333333333\ldots\times 10^{-15}$

7.021621519*10^{-15}

From the four results

7.021621519*10^-15 ; 1.57986484181*10^-14 ; 7.021621519159*10^-17 ;

-4.38851344947*10^-16

we obtain, after some calculations:

sqrt[1/(2Pi)(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 - 4.38851344947*10^-16)]

Input interpretation:

$$\sqrt{\left(\frac{1}{2\pi}\left(7.021621519\times 10^{-15}+1.57986484181\times 10^{-14}+7.021621519\times 10^{-17}-4.38851344947\times 10^{-16}\right)\right)}$$

Result:

$5.9776991059\ldots \times 10^{-8}$

$5.9776991059*10^{-8}$ result very near to the Planck's electric flow 5.975498×10^{-8} that is equal to the following formula:

$$\phi_{\mathrm{P}}^{E}=\mathbf{E}_{\mathrm{P}}\, l_{\mathrm{P}}^{2}=\phi_{\mathrm{P}}\, l_{\mathrm{P}}=\sqrt{\frac{\hbar c}{\varepsilon_0}}$$

We note that:

1/55*(([(((1/[(7.021621519*10^-15 + 1.57986484181*10^-14 +7.021621519*10^-17 -4.38851344947*10^-16)])))^1/7]-((log^(5/8)(2))/(2 2^(1/8) 3^(1/4) e log^(3/2)(3)))))

Input interpretation:

$$\frac{1}{55}\left((1/(7.021621519\times10^{-15}+1.57986484181\times10^{-14}+7.021621519\times10^{-17}-4.38851344947\times10^{-16}))\,\hat{}\,(1/7)-\frac{\log^{5/8}(2)}{2\sqrt[8]{2}\,\sqrt[4]{3}\,e\log^{3/2}(3)}\right)$$

log(x) is the natural logarithm

Result:

1.6181818182…

1.6181818182… result that is a very good approximation to the value of the golden ratio 1.618033988749...

From the Planck units:

Planck Length

$$l_P=\sqrt{\frac{4\pi\hbar G}{c^3}}$$

5.729475 * 10^{-35} Lorentz-Heaviside value

Planck's Electric field strength

$$\mathbf{E}_P=\frac{F_P}{q_P}=\sqrt{\frac{c^7}{16\pi^2\varepsilon_0\hbar G^2}}$$

1.820306 * 10^{61} V*m Lorentz-Heaviside value

Planck’s Electric flux

$$\phi_{\mathrm{P}}^{E} = \mathbf{E}_{\mathrm{P}} l_{\mathrm{P}}^{2} = \phi_{\mathrm{P}} l_{\mathrm{P}} = \sqrt{\frac{\hbar c}{\varepsilon_0}}$$

$5.975498 * 10^{-8}$ V*m Lorentz-Heaviside value

Planck’s Electric potential

$$\phi_P = V_P = \frac{E_P}{q_P} = \sqrt{\frac{c^4}{4\pi\varepsilon_0 G}}$$

$1.042940 * 10^{27}$ V Lorentz-Heaviside value

Relationship between Planck’s Electric Flux and Planck’s Electric Potential

$E_P * l_P$ $= (1.820306 * 10^{61}) * 5.729475 * 10^{-35}$

Input interpretation:

$$\frac{(1.820306 \times 10^{61}) \times 5.729475}{10^{35}}$$

Result:

1 042 939 771 935 000 000 000 000 000

Scientific notation:

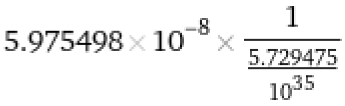
$1.042939771935 \times 10^{27}$

$1.042939771935 * 10^{27} \approx 1.042940 * 10^{27}$

Or:

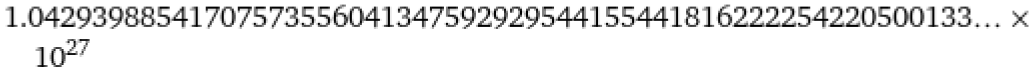
$E_P * l_P^2 / l_P$ = $(5.975498*10^{-8})*1/(5.729475 * 10^{-35})$

Input interpretation:



$$5.975498 \times 10^{-8} \times \frac{1}{\frac{5.729475}{10^{35}}}$$

Result:



$$1.0429398854170757355604134759292954415544181622225422050013 3\ldots \times 10^{27}$$

$1.042939885417*10^{27} \approx 1.042940*10^{27}$

Acknowledgments

We would like to thank Professor **Augusto Sagnotti** theoretical physicist at Scuola Normale Superiore (Pisa – Italy) for his very useful explanations and his availability

References

Current Exchanges and Unconstrained Higher Spins - *D. Francia, J. Mourad and A. Sagnotti* - arXiv:hep-th/0701163v2 25 Mar 2007

Ghost-free *F (R)* bigravity and accelerating cosmology
Shin'ichi Nojiri , Sergei D. Odintsov - Physics Letters B 716 (2012) 377–383

Modular equations and approximations to π - *Srinivasa Ramanujan*
Quarterly Journal of Mathematics, XLV, 1914, 350 – 372

An Update on Brane Supersymmetry Breaking
J. Mourad and A. Sagnotti - arXiv:1711.11494v1 [hep-th] 30 Nov 2017

AdS Vacua from Dilaton Tadpoles and Form Fluxes - *J. Mourad and A. Sagnotti* - arXiv:1612.08566v2 [hep-th] 22 Feb 2017 - March 27, 2018

Properties of Nilpotent Supergravity
E. Dudas, S. Ferrara, A. Kehagias and A. Sagnotti - arXiv:1507.07842v2 [hep-th] 14 Sep 2015